Independent guide to the BBC MICRO!

THE MICRO USER

Volume 2
Number 12
February 1985
£1.25

Pilot: full listing of the language

The ultimate disassembler

Craal . . . adventure at its best

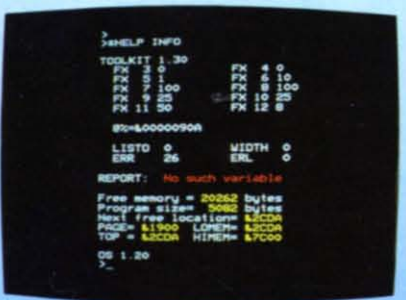
HOW TO WRITE MACHINE CODE GAMES

'COPTER DOGFIGHT

A game of cunning for two players

TOOLKIT ROM from BEEBUGSOFT

BASIC Programmer's Aid for the BBC micro



```
>
>*HELP INFO

TOOLKIT 1.30
  FX  3 0            FX  4 0
  FX  5 1            FX  6 10
  FX  7 100          FX  8 100
  FX  9 25           FX 10 25
  FX 11 50           FX 12 8

  @%=&0000090A

  LISTO  0           WIDTH  0
  ERR    26          ERL    0

REPORT:  No such variable

Free memory = 20262 bytes
Program size=  5082 bytes
Next free location= &2CDA
PAGE= &1900  LOMEM= &2CDA
TOP = &2CDA  HIMEM= &7C00

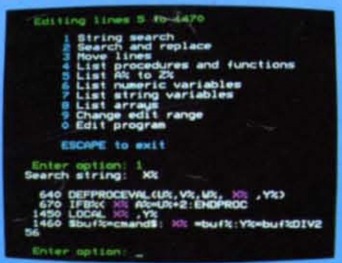
OS 1.20
>_
```

- 27 new commands to make life easier
- Saves hours in program development and debugging
- Supports both cassette and disc systems
- No command name conflict with other Roms
- Ideal for expert and novice alike
- Fitting instructions and a 32 page manual supplied
- You'll wonder how you ever managed without it

SPECIAL FEATURES INCLUDE

SCREEN EDITOR An extremely powerful editor, allowing the use of cursor keys to list a program line-by-line in either direction and move to any part of a program to overtype or insert new code and corrections.

ERROR DETECTION Powerful facility to trap an error in a Basic program as it runs. It will then automatically enter the Screen Editor, display the line in error and position the cursor close to the statement at fault.



```
Editing lines 5 to 1470

      1 String search
      2 Search and replace
      3 Move lines
      4 List procedures and functions
      5 List A% to Z%
      6 List numeric variables
      7 List string variables
      8 List arrays
      9 Change edit range
      0 Edit program

      ESCAPE to exit

 Enter option: 1
Search string:  X%

  640 DEFPROCEVAL(U%,V%,W%, X% ,Y%)
  670 IFB%< X% A%=U%+2:ENDPROC
 1450 LOCAL X% ,Y%
 1460 $buf%=cmand$: X% =buf%:Y%=buf%DIV2
56

 Enter option: _
```

> "TOOLKIT is an essential utility for all Basic programmers using the BBC Micro. . . .an indispensable aid packed full of powerful utilities."
> EDUCATIONAL COMPUTING MARCH 1984
>
> ". . . highly recommended,"
> PCN MARCH 17 1984

> "The Beebugsoft Toolkit costs £27 and in my opinion is worth every penny. Since it has been installed in my BBC it has been used extensively and I can find no fault with it. Highly recommended to lazy programmers!"
> COMPUTING TODAY JUNE 1984

COMMANDS

*CHECK	Verify a program or data in memory with disc/cassette.
*CLEAR	Clear all variables including integers.
*EDIT	Enter full screen editor.
*FREE	Display free memory and pseudo variables.
*HELP INFO	Display a screenful of useful system information.
*MEMORY	Display memory contents.
*MERGE	Merge a program in memory with one on disc/cassette.
*MOVE	Move program to run at specified address.
*NEW	As NEW, but can be issued from within a program.
*OFF	Cancel enhanced error handling.
*OLD	As OLD, but can be issued from within a program.
*ON	Auto error handling – enters editor at line in error.
*PACK	Efficient program compactor.
*RECOVER	Intelligently recover bad programs.
*RENUMBER	Allow partial renumbering.
*REPORT	Extended error reporting facility.
*SCREEN	Screen dump to cassette or disc.
*UTIL	Display utilities menu.
*UTIL 1	String search.
*UTIL 2	String search and replace.
*UTIL 3	Move Basic program lines.
*UTIL 4	List procedures and functions.
*UTIL 5	List values of A% to Z%.
*UTIL 6	List numeric variables.
*UTIL 7	List string variables.
*UTIL 8	List names of arrays.
*UTIL 9	Set up range for utilities 1 and 2.

BEEBUG SOFT

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Mail order (Post Free) to:

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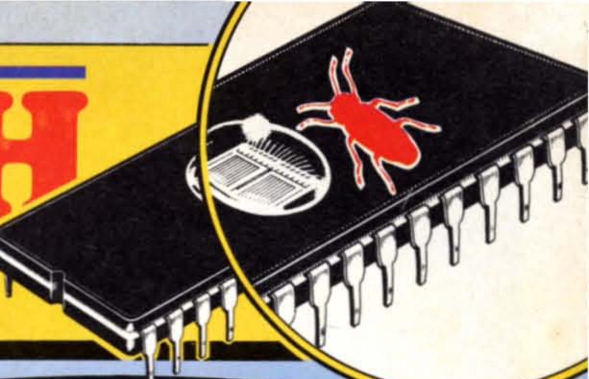
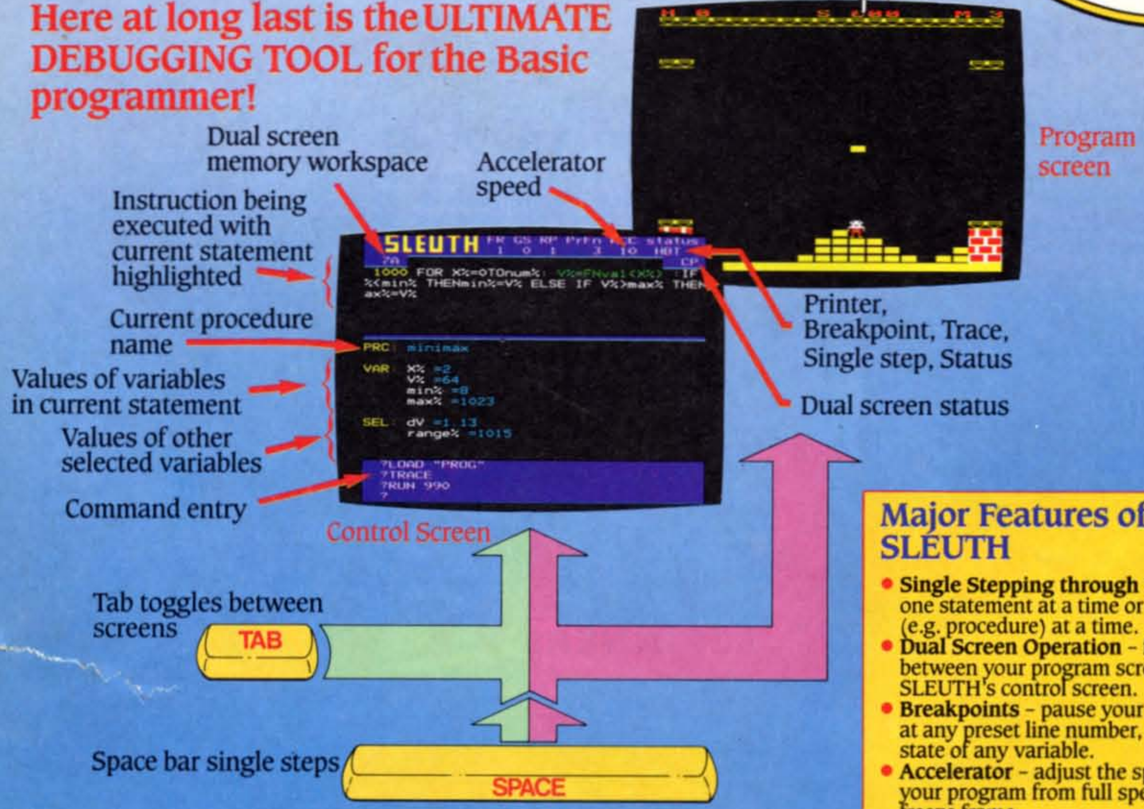
B.B.C. Micro

SLEUTH



Looking for bugs in your Basic?
Let Sleuth track them down.

Here at long last is the ULTIMATE DEBUGGING TOOL for the Basic programmer!


Dual screen memory workspace
Accelerator speed
Instruction being executed with current statement highlighted
Current procedure name
Values of variables in current statement
Values of other selected variables
Command entry
Control Screen
Program screen
Printer, Breakpoint, Trace, Single step, Status
Dual screen status
Tab toggles between screens
TAB
Space bar single steps
SPACE

```
SLEUTH FR GS RP PrFn ACC status
        1  0  1    3  10  HBT
 ?A                            CP
 1000 FOR X%=0TOnum%: V%=FNval(X%) :IF
%<min% THENmin%=V% ELSE IF V%>max% THEN
ax%=V%

PRC: minimax

VAR: X% =2
     V% =64
     min% =8
     max% =1023

SEL: dV =1.13
     range% =1015

 ?LOAD "PROG"
 ?TRACE
 ?RUN 990
 ?
```

SLEUTH allows you to single step through your Basic program instruction by instruction, watching your screen display as it is built up. Simply press the Space Bar to execute the next instruction. Alternatively you may watch SLEUTH's control screen as you step through your program. (Press Tab to toggle between your own screen and the control screen.) This will show you the next instruction to be executed and allow you to list any part of the program. Also displayed will be the contents of all variables associated with the current instruction and the values of other specified variables.
At any time you may alter the values of any variable or update memory. You can even change the line number of the next instruction to be executed or alter the logic within a program statement. Then simply press the Space Bar to watch the next instruction execute.
Breakpoints may also be set up at any position in your program, these allow you to speed to the problem area and then see exactly what's happening. You may even set conditional breakpoints. e.g. Stop IF A%=20.
Advanced trace and decelerator facilities are also included. The decelerator allows you to alter the speed at which your program executes, actually as it is running.

SLEUTH is ideal for the novice and expert alike and will prove to be instantly invaluable, saving hours of debugging time. In addition, the single stepping facility makes it a powerful teaching aid.

Major Features of SLEUTH

- **Single Stepping through Basic** – one statement at a time or a block (e.g. procedure) at a time.
- **Dual Screen Operation** – flip between your program screen and SLEUTH's control screen.
- **Breakpoints** – pause your program at any preset line number, or on the state of any variable.
- **Accelerator** – adjust the speed of your program from full speed to freeze frame.
- **Full Feature Control Screen** – monitor and update vital aspects of your program as it runs.
- **Trace** – a sophisticated line trace facility operating when program runs.

Control Screen Features

- Control screen entered at the press of a key.
- Select edit or single-step mode.
- Adjust program run speed (1-100%).
- View the current program line with the current statement highlighted.
- List the whole or any part of your program.
- Alter the next line number to be executed.
- Read and adjust the value of variables in the current statement.
- Read and adjust the values of any other specified variables or array parameters.
- Insert or remove breakpoints and conditional breakpoints.
- Return to the program screen or continue to single-step or to run at any speed.

BEEBUG SOFT

Price **£29.00**

TEL ST. ALBANS (0727) 60263

MAIL ORDER (POST FREE) TO: BEEBUGSOFT,
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Independent guide to the BBC MICRO!
THE MICRO USER
'COPTER DOGFIGHT

Vol. 2 No. 12 Feb 1985

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January-June 1984

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Back issues to binders, cassettes to cases, discs to disc covers – they're all here.

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See Page 113 for details of our great free contest – there are three complete systems to be won.

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Prints all BBC Micro
screen Modes inc.
Mode 7 . . . in full colour

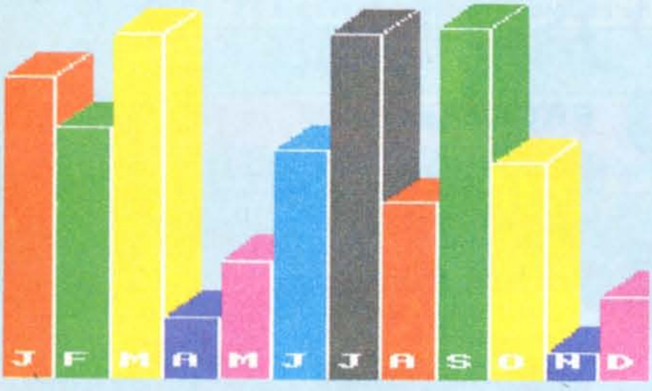
£550 (Rec. price excl. VAT)

With Centronics parallel interface and free BBC Micro dump listing.

Prints overhead transparencies

Options available:

- Buffered RS232 interface.
- Viewdata & RS232 interface.
- Apple II interface.
- IBM PC dump.



from BBC Micro screen – ½ size mode

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640 dots/line + 1280 dots/line high res mode.

Double strike mode.

84 dots/inch both axes.

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40cps in full colour.
Ink cartridges, 4 million character life.

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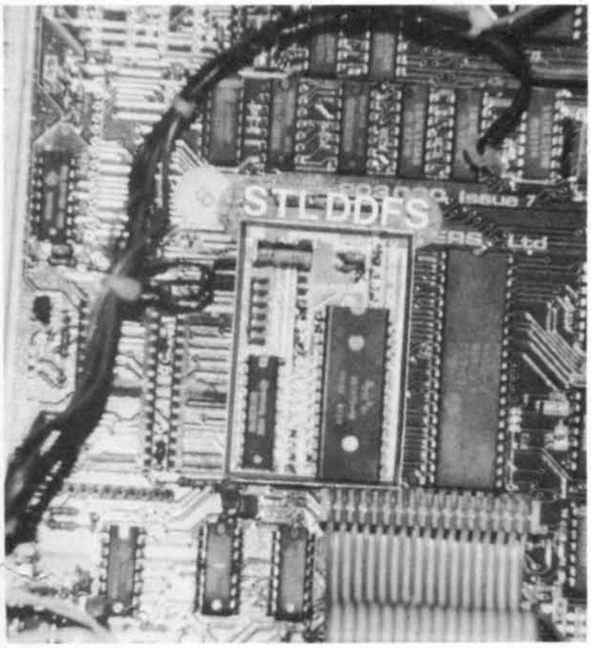
FROM SMALL ACORNS, SOLIDISK GROWS.

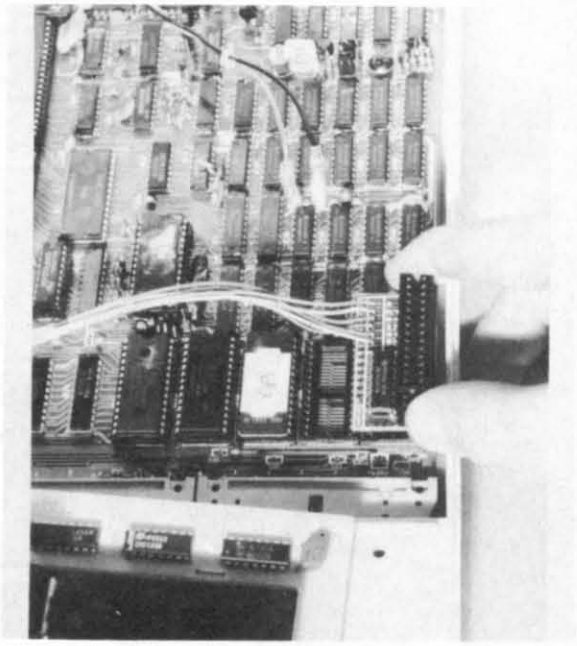
IN JULY 1983, we released the Sideways RAM for the BBC computer. We sold 5 in the first week, 10 in the second week, 20 in the third and one year later, we sell more than 500 in the UK and well more than 100 a week abroad.

By the time you read this, more than 30,000 Solidisk Sideways RAM boards will be beavering away in hundreds of schools and thousands of homes.

They are being joined by thousands of Solidisk DDFS each month. Soon, we hope, they will all be linked together by Solidisk Single Chip MODEM.

To support the users, a network of Solidisk Local Experts, covering the UK, Holland, France, Australia and Israel has been set up and expanding. Providing fitting and software for free.





SOLIDISK DOUBLE DENSITY DFS 1.5:
Single and Double Density.
Automatic Density Selection.
1 or Twin Drives, 40 and 80 Tracks, Single and Double Sided.
Automatic 40 and 80 Track Selection.
31 Filenames.
Low Cost.

SOLIDISK DOUBLE DENSITY DFS 2.0:
Virtually Unlimited Number of Filenames.
Automatic Tape to Disk.
Built-in Disk Fix and Disk Sector Editor.
Built-in Wordprocessor.
Does not Require DNFS With Z80 and 6502 Second Processors.

SOLIDISK SIDEWAYS RAM:
Add from 16k to 256k bytes of RAM to the BBC 32k RAM.
Useable for running Sideways ROM Software.
Useable in Networks or on BBC with Disk Drive(s).
Compatible With All Acorn Existing Products.
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Compatible With Most Sideways ROM Software.
Available Multi User Licencing Agreement from Leading Software Houses.
Easily Expandable as Your Needs Grow.
Low Cost.
Free Installation if Required.
Very large User Base, Extensive Free Software.
Local Help by Solidisk Local Expert Network.
Free Membership to receive Periodic Newsletters.

COMING SOON:
SOLIDISK is at present developing a state of the art MODEM. This will be compatible with the CCITT V23 and BELL 202 transmission standards at speeds from 5 to 1200 Bauds and will be based on the TMS 3105 single chip FSK MODEM manufactured by TEXAS Instruments.
The price is expected to be £39.95 inclusive of VAT.

We need you and your help. To make Solidisk Users the largest BBC Users Group. To share good ideas and good ways to use them.

SOLIDISK TECHNOLOGY, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX
TEL. (0702) 354674 (10 lines).

HAVE YOU ALREADY GOT DISK DRIVE(S) FOR YOUR BBC COMPUTER?

OPERATIONS	S/D TIME	D/D TIME
FORMAT 40 TRACKS:	17.74	17.74
FORMAT 80 TRACKS:	33.22	33.22
VERIFY 40 TRACKS:	9.30	9.30
VERIFY 80 TRACKS:	17.84	17.84
BACKUP 01 80 TRACKS:	37.69	37.69
BACKUP 02 80 TRACKS:	39.46	39.46
COMPACT 100K-10 FILES	22.42	18.82

THE SOLIDISK DOUBLE DENSITY DFS

If you take your Disk Systems seriously then there are very few viable alternatives to our new Double Density Filing System.

Anyone, with their ear to the ground, will probably have heard of the great shortage of the 8271 Floppy Disk Controller chip. This chip is, of course, the basis of all single density DFS upgrades for the BBC Microcomputer and is used extensively by Acorn, AMCOM and Watford Electronics in their respective DFS's.

This shortage can mean long delays or paying much inflated prices to obtain your Disk Upgrade.

Now, however, we at SOLIDISK have developed an alternative system with many advantages over the 8271 based upgrades. Not the least of these being continuation of supply of the FDC chip (Western Digital 1770) but, also, improvements in the speed and versatility of operation.

CUT THE COST OF
4 — OUTSTANDING PERFORMANCE:
SOLIDISK TECHNOLOGY LI
STL

EASY TO INSTALL

The SOLIDISK DDFS comes complete with an easy to follow manual with step by step installation instructions, and can be fitted in just a few minutes by anyone with just the barest knowledge of the insides of their BBC.

The DFS contains just 4 IC's and 2 jumpers to be inserted and one link to be cut in the computer. This is compared to the usual upgrades which require 11 IC's to be fitted and the link to be cut.

EASY TO USE

The SOLIDISK DDFS Revision 1.5 contains many time and labour saving features. These include formatter, verifier, automatic density sensing, automatic 40/80 track switching and Single/Double Density mass copying etc.

COMPLETE CONTROL OVER THE DISK

SOLIDISK DDFS gives you complete control over your disk drive(s). You can use any combination of Single/Double Density, 40 or 80 tracks in one or two disk drives.

Every time the SOLIDISK DDFS accesses the disk it detects the density and the disc size in use and acts accordingly.
You can for example copy from a 40 to an 80 track disc on the same 80 track disk drive or even format a 40 track disk in an 80 track drive using the automatic disc size sensing in the DDFS. It is also possible to have one side of a disc formatted in Single Density and the other side in Double Density. Also copying between different densities is coped with automatically and, when using twin drives, is very fast.

RUNNING YOUR MACHINE
OPERATIONS
S/D TIME
D/D TIME

GREATER DISC CAPACITY

When formatting a disk with the SOLIDISK DDFS you have a choice of the usual Single Density or the increased capacity Double Density.

Formatting in Single Density will leave your disk compatible with all other Single Density systems. However if the disk is formatted in Double Density it will have a 60% greater capacity than the equivalent size Single Density disk. This means that on an 80 track disk that the capacity is increased from the usual 400 kbytes to 640 kbytes of storage. The Double Density Format used is, at present, unique to the SOLIDISK DDFS and provides 16 sectors per track as opposed to the usual 10 sectors in Single Density giving a 40% saving in media surface for a file of given length over Single Density.

INCREASED SPEED OF OPERATION

As mentioned previously a disk formatted in Double Density uses about 40% less disk space per given length of file than does a disk formatted in Single Density or alternatively it holds 60% more information per track. This allows the, already fast, SOLIDISK DDFS to run very fast in the Double Density mode as demonstrated in the benchmark test on the next page.

BENCHMARK OUTSTANDING PERFORMANCE:

The table below shows the benchmark timing for STL DDFS 1.4. The benchmark consists of disk operations such as save and load a 16k program, open and close files, BPUT, BGET strings and numbers, format and verify a disk etc., and is available upon request, otherwise listed in Solidisk DDFS User Manual.

The benchmark tests B1 to B9 are the same as used by many reviewers. The time is expressed in seconds and parts of 100th of a second. The disk drives are twin 40/80 track double sided MITSUBISHI M4853, the diskettes are Verbatim Datalife MD 557 series, 96 TPI, double density, double sided, pre-verified to ensure that the media is free of all error and mechanical defects and containing solely the benchmark program. The test is loaded into memory, the drive motors are allowed to stop completely 2 seconds between tests, 10 timing samples are taken and the mean time is calculated automatically.
For example:

```
100 DEFFNb1:REM Save a 16k program.
110T% ÷ TIME
120 *SAVE A 8000 +4000
130 ÷ TIME — T%
```

Full listings are included in the User Manual.
This FN is called 10 times with 3 sec. interval, the mean result is printed as 'B1'.

BENCHMARK DESCRIPTION	S/D TIME	D/D TIME
B1 Save 16k	2.62	1.43
B2 Load 16k	2.45	1.23
B3 Openin and close 100 times	20.70	20.16
B4 Openout and print 1000 numbers (255)	5.84	4.66
B5 Openin and input 1000 numbers (255)	4.72	4.14
B6 Openout and print 100 80 bytes strings	6.18	4.91
B7 Openin and input 100 80 bytes strings	4.90	4.31
B8 BPUT 100 bytes (255)	3.01	2.06
B9 BGET 1000 bytes (255)	1.88	1.52

Note 1: Whenever a file is to be opened, STL DDFS automatically refreshes the disk directory, thus preventing erroneous disk change. Many other DFS's do not take the same care, although yielding a much shorter time, and this could accidentally stop the program.

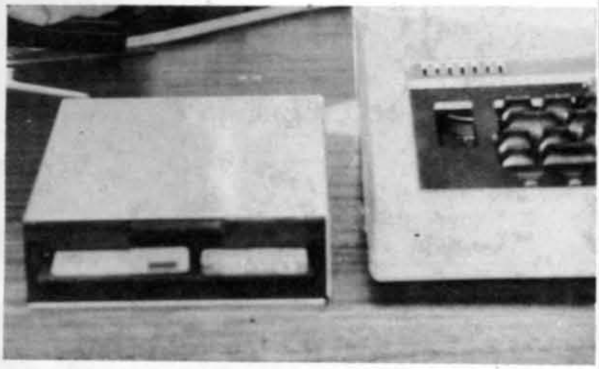
OPERATIONS	S/D TIME	D/D TIME
FORMAT 40 TRACKS:	17.74	17.74
FORMAT 80 TRACKS:	33.22	33.22
VERIFY 40 TRACKS:	9.30	9.30
VERIFY 80 TRACKS:	17.84	17.84
BACKUP 01 80 TRACKS:	37.69	37.69
BACKUP 02 80 TRACKS:	39.46	39.46
COMPACT 100K 10 FILES	22.42	18.82

With Wordwise:
Load 2000 words (17811 bytes) 16.80 sec. (41.40 sec. with AC).
With Scribe:
Count 2000 words (17811 bytes) 4.20 sec. (9.80 sec. with AC.90 DFS)
With Beebug's Masterfile:
Sort records 1 to 20 in PEOPLE sample database, the database is presorted on field 2 then the program is asked to sort on field 1, the time is then taken: 56.23 sec. (127.86 sec. with AC.90 DFS).
These timings are improved even further in double density mode.

The figures speak for themselves.

STL DDFS dramatically increases the operating speed of your software, including wordprocessors like Wordwise, View, Scribe, databases like Masterfile, Starbase etc.

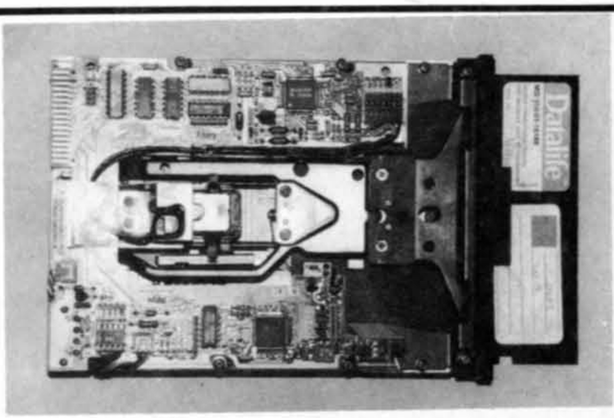
Solidisk engineers won't stop there.



MITSUBISHI DISK DRIVE:
From the new VLSI ultra quiet auto spin-up series comes the MITSUBISHI M4853. We have chosen it for its speed, quiet performance, low power consumption and state of the art design — look at the following features:
— new developments by Motorola and Mitsubishi largely reduce the area taken up by electronics, leaving more room for the diskette. This in turn implies lower noise levels and reduced friction on diskettes.

8 Slim 5.25" half height model attractively cased in BBC micro beige
— Reliability; we find that Mitsubishi compares most favourably with other makes
— Use your BBC own power supply —
— Single and double density available, plus ability ro read 40 track diskettes formatted elsewhere when used with our DFS.

Of course, we don't need to mention that all drives come complete with Dual leadds letting you add instantly a second disk drive and manual together with full guarantee on parts and labour.



EXTRA FEATURES OF SOLIDISK DDFS 2.0

With the production of the SOLIDISK DDFS 2.0 ROM we raise the already high standard of the previous DDFS 1.5 ROM.

The larger memory capacity of the DDFS 2.0 has allowed inclusion of a Wordprocessor and complete Disk Toolkit as well as a totally new concept in the working of the Disk Directory.

This will, we feel, make the SOLIDISK DDFS 2.0 ROM the most powerful Disk System currently available.

1) EXTENDED NUMBER OF FILENAMES

The standard number of filenames on the BBC microcomputer is limited to 31on most Single Density DFS's. This usually presents no problem on a system using 40 track drives but when using either 80 track drives and/or a Double Density Filing System this number will quite often be reached with a lot of the disk space still unused.

The SOLIDISK DDFS 2.0 ROM uses a unique and novel way to circumvent this shortcoming as every time a catalogue becomes full a new one is created. This gives the possibility of having up to 1502 filenames on a normal 80 Track Double Sided disk. Even with this large number of filenames worst case access taking only just over 2 seconds. Obviously with large files and a lesser number of filenames the access time decreases dramatically.

The way that the DDFS 2.0 ROM operates means that ordinary single catalogue discs are completely compatible with our system and, indeed, will be upgraded to multi catalogue once the number of filenames exceeds 31. This means no special formatting is necessary and that the disc remains compatible with other Single Density DFS's.

2) DISK TOOLKIT

Included on the SOLIDISK DDFS 2.0 ROM is a powerful disk repair facility. It is possible to read a complete track into memory and to repair or modify the data before restoring the track to the disk. If only one sector needs to be worked on then this too is possible with the Disk Sector Editor contained in the DDFS 2.0.

A powerful Disk Copy routine is also included to allow mmost non-standard format disks to be duplicated. This routine will also displaay the Sector I.D. Fields so that it is possible to see the makeup of the track being copied.

3) WORDPROCESSOR:

SOLIDISK DDFS 2.0 ROM contains a Word Processor with many excellent features such as 80 column screen, automatic on screen justification, Search and Replace, Block Move and Copy etc.

SOLIDISK+MITSUBISHI BIG DEAL:

This is exactly what you would receive:

— one double sided 80 track Mitsubishi M4853 disk drive, cased in beige.
— one Solidisk Double density disk interface (complete with STL DDFS 1.5 ROM) as described overleaf, giving a total capacity of 640K.
— Dual leads and instruction manual.
— 5 Software Diskettes containing a selection of the most prestigious programs written for the BBC.
— full one year guarantee.
—all for £209.95 including VAT and post and packing.

THE HARDWARE:
As described earlier and opposite.

THE SOFTWARE:
A selection of 6 programs based on ease of use, and popularity. All efforts are made so that you would not have to read the manual twice.
All programs feature on screen help (word processor) or option menus throughout. Mode 3 is used throughout whenever possible for good visual representation.

— Solicalc —
A Disc Based electronic spreadsheet made only possible with the speed of Solidisk DDFS. The sheet size can be as big as 170 kbytes. Written in modules, it is easily upgradable. Mode 3 screen. Goto, Calculate, Replicate, Automatic Header etc.

— Solidisk Datafile —
A fast, efficient and random access Database. Solidisk Datafile features:
— Compact size.
— 80 column screen throughout.
— 15 fields of 60 characters per card.
— Unlimited number of cards.
— Powerful Screen Editing allowing VERY FAST data entry on new cards or data correction on old cards.
— All Maths functions on ALL fields admitting Symbolic Variables (like A, B, C, D etc) for entering formulae.
— Special SORT program making use of any free disk space to avoid swapping cards.
— Standard options include View, Print using Tabulation, Print Labels, Search on any number of criteria and repeat on count, Amend, Create, Spool to disk, Append and Mailmerge with Solidisk Word Processor (requires EPSON compatible printer).
— Ability to read BEEBUG's Masterfile and possibly other systems later on.

— Solidisk wordprocessor —
On screen help, Wordstar style cursor editing and control keys, on screen justification while you type, Block commands, Quick commands and dot commands for mailmerge. Future development will allow reading Wordstar text from the Z80 second processor. Solidisk can offer Laser Typesetting and Page Planning service: it costs you only £1.00 for typesetting 1×A4 page (around 4,000 characters) from disk received by MODEM.

— Stock control —
useful for small businesses. Features include menu driven, easy to follow instructions, easy categorising. Stock evaluation reports and inventories, together with price lists and reorder forms can be printed automatically as requested.

— Silexicon — the most successful spelling checker with English, French and German dictionaries, together with self generating capability.

— Macrobasic —
a BASIC program generator capable of using bits of old programs to create new ones. Clever ideas — clever ideas of making them work!

Please note that this software is only free as prt of the package deal. It is otherwise avaiable at a cost of £14. Customers who would prefer the DFDC version of our disk filing system (see earlier) can purchase the package deal with this option for an extra £10.
What we may need to tell you is that the price is also agreeably low — check what we offer against any of our competitors — which all adds up to a high degree of sophistication affordable to students and businessmen alike.

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We have local people able to fit your equipment FREE OF CHARGE in all of the following towns. If your area is not mentioned ring the office!

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INTRODUCING THE DFDC!

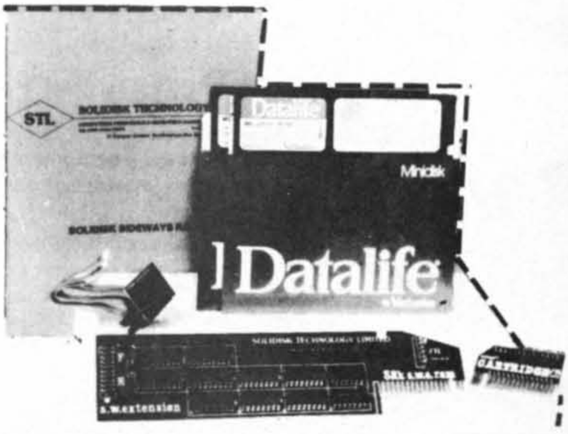
For those who already have the Acorn DDFS installed in their computer and would like the advantages of increased speed and storage capacity that Double Density systems offer SOLIDISK have introduced a totally new concept in the shape of the DFDC!

The DFDC board simply sits in place of the 8271 FDC, this being reinstalled in the DFDC boaard. Now all that needs to be done is to install the DDFS ROM into a Rom Socket, to the right of the existing Acorn DFS, and two other minor connections.

Great Value at £49.95 inc.

HAS YOUR BBC COMPUTER GOT ITS SIDEWAYS RAM BOARD YET?

"Break the Ram Barrier" (A&B)



HOW TO ORDER?

You can order any item using the coupon. Prices are inclusive of VAT, post and packing. Access and Barclay card holders can place their order by phone.
Educational authorities, Acorn dealers and OEMs can obtain quantity discounts.

OTHER PRODUCTS FROM SOLIDISK:
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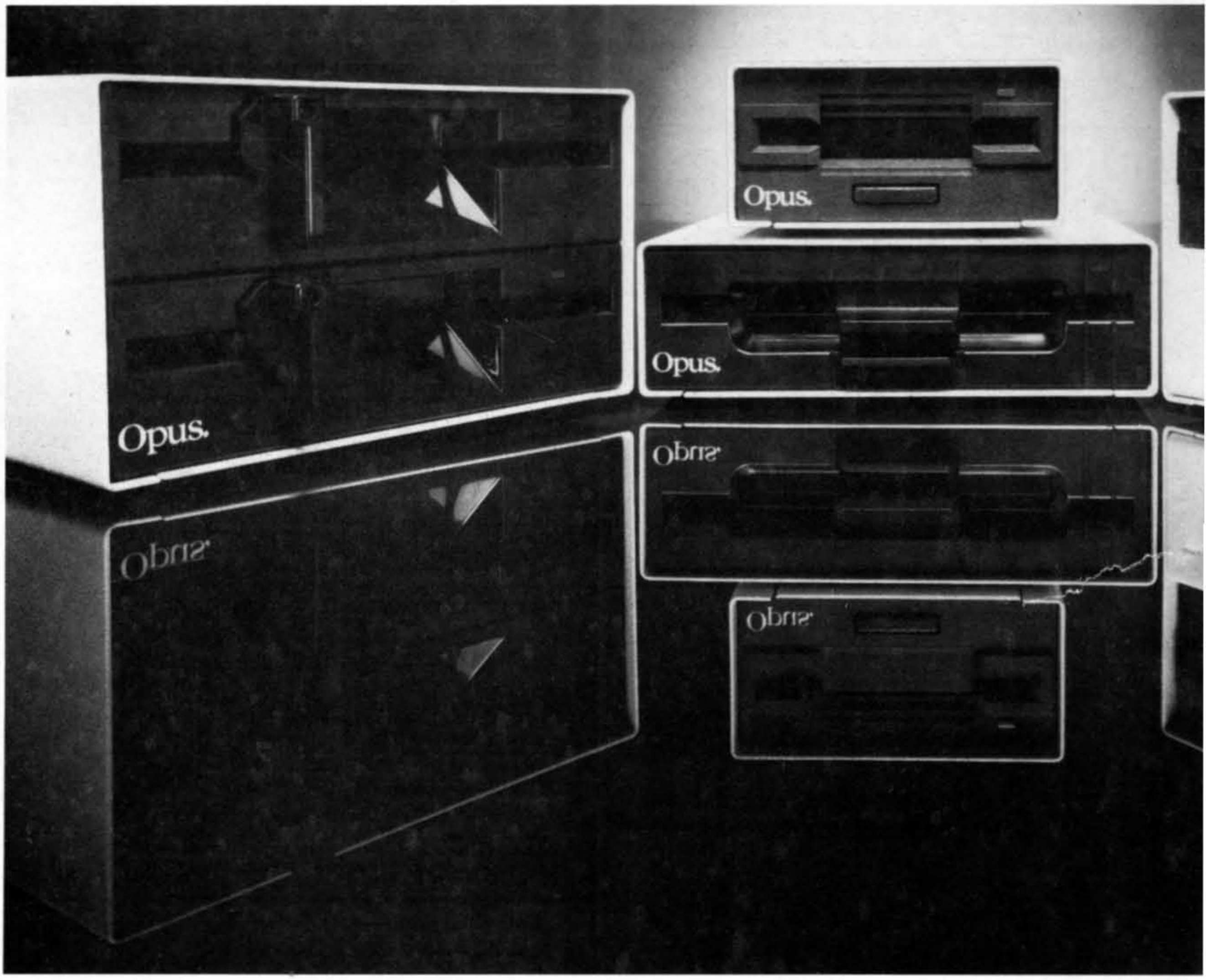

The quality of Opus disc drives has always been held in high regard.

Nowhere more than at Cambridge University.

It was their Computer Laboratory who selected Opus after evaluating many other makes of disc drives.

They were selected because of their competitive prices, reliability and quality of after-sales service.

And all the drives have been tested to the limit – running for 8,000 hours. That's a year of constant use without failure.

They can be bought as single or dual drive and vary from 100K to 1.6 Megabyte, catering for the beginner to a tutor requiring a system for the largest of classroom networks.

All this is backed up by a two year guarantee on every drive – a year more than any other company can offer.

5¼" SINGLE DISC DRIVES.

5400 100K Single sided 40 Track	**£119.95**
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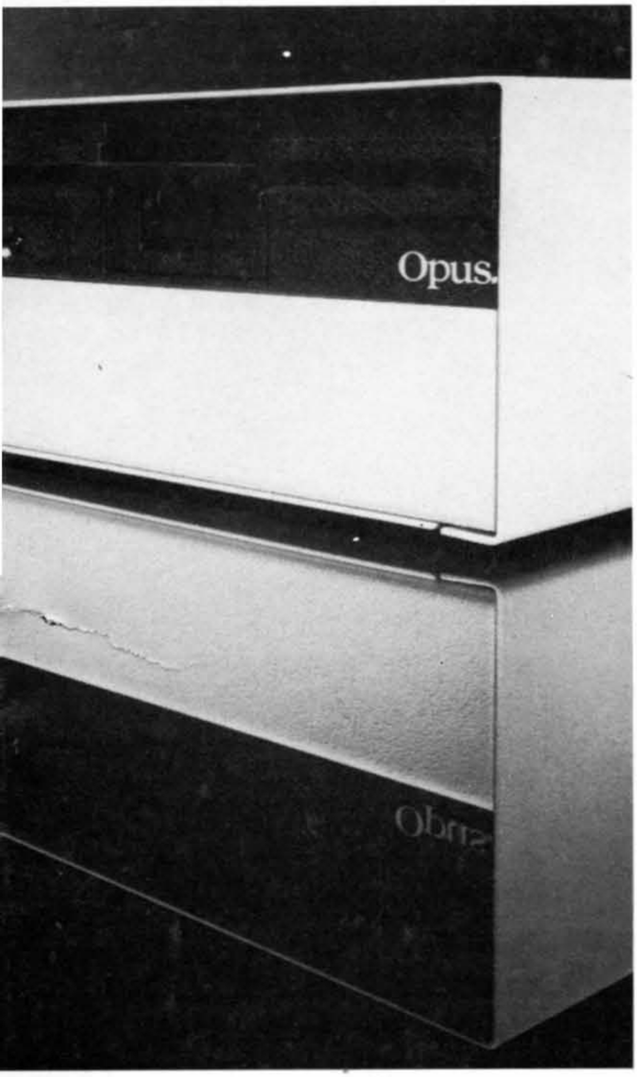

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5401D 200K/400K on line Single sided 40 Track	**£349.95**
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5802D 800K/1.6 Megabyte on line Double sided hardware switchable 80/40 Track	**£429.95**

You can find Opus products by just making an appearance at one of the retailers listed opposite. Alternatively, you can contact us for the address of your nearest stockist. Opus Supplies Ltd., 158 Camberwell Rd., London SE5 0EE. Tel: 01-701 8668, 01-703 6155.

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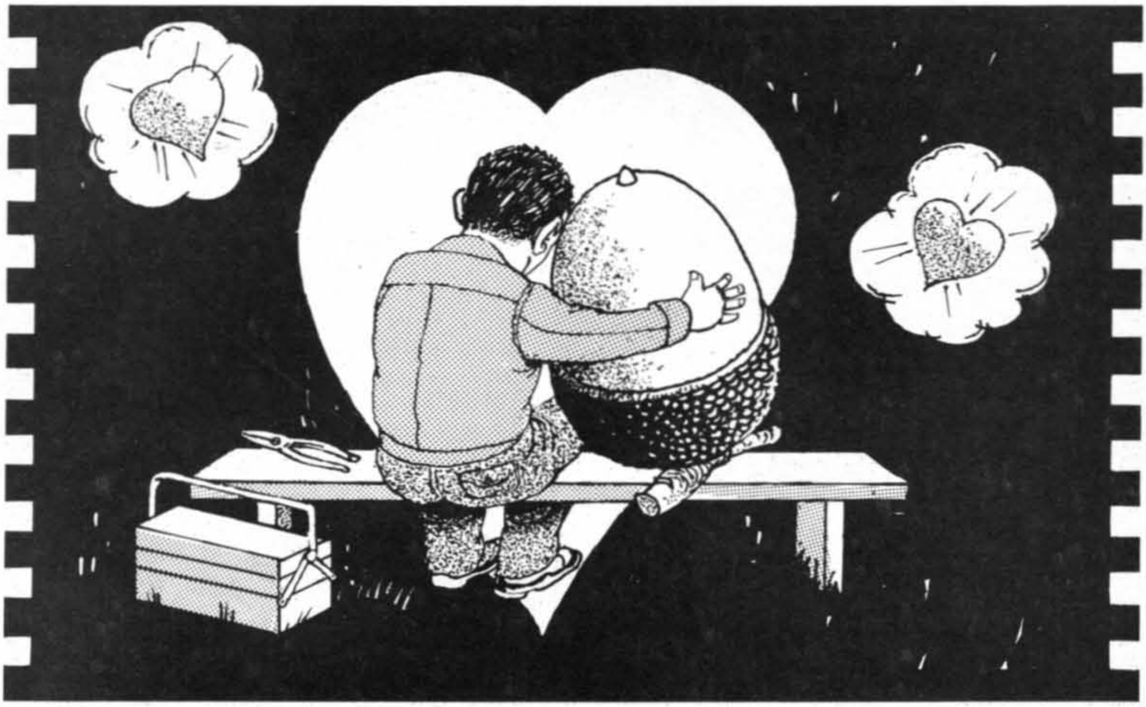

RCS Computer Services are the main service centre for the Acorn Computer, it is fully equipped to undertake a comprehensive range of services.

★ WARRANTY/GUARANTEE ★

If your computer (BBC or Electron), B/W Monitor, cassette recorder or disk drive as supplied by Acorn becomes defective within the warranty period, RCS Computer Services are authorised to carry out the repair and return the equipment free of charge. All charges in this connection being paid by Acorn Computers.

★ EXTENDED GUARANTEE/ANNUAL MAINTENANCE CONTRACTS ★

The experience of RCS Computer Services allows us to offer a comprehensive guarantee extension or annual maintenance contracts at competitive prices, this applies not only to the standard Acorn product by also to a range of approved peripherals including printers, colour monitors etc.

★ UPGRADES ★

Supply and installation of upgrades such as DFS, Econet, Teletext etc. can be carried out quickly, efficiently and professionally by trained staff at our Service Centre.

★ SYSTEM INSTALLATION ★

Supply and installation of Econet Systems can be arranged and fully commissioned.

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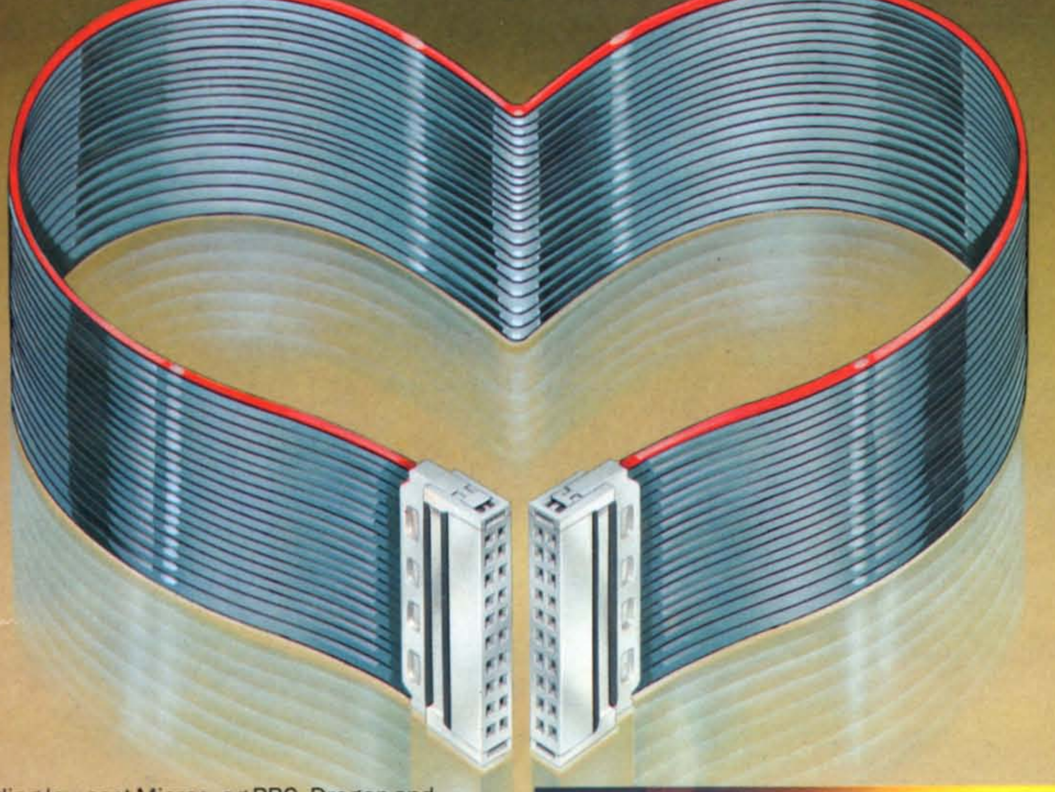
WHY MICROS LOVE MT80



Most leading low cost Micros, eg BBC, Dragon and Sinclair QL love the MT-80 printer from Mannesmann Tally. It is fully hardware compatible and with a range of cable options, gives trouble-free straight through plug-in facilities.

You'll love it too, for its sophisticated looks, and its range of *standard features*, which include 80 col, 80 cps optimised bi-directional printing with dot addressable and line graphs, quick tear-off facility, friction and tractor feed, and easy change cassette ribbon. And all for an ex-VAT price of around £200.

Options include <55dBa sound reduction kit and 2K buffered serial interface.

The dealer who supplies you is supported by Mannesmann Tally, Europe's leading printer manufacturer. Your guarantee of continued support and assistance throughout the life of the printer.

Ask your nearest dealer for a demonstration, or phone us today for full details. Either Annie, Sali, Terry or Geoff will be only too pleased to help you.

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THE FIRST NAME IN PRINTING

Mannesmann Tally, Molly Millar's Lane, Wokingham, Berkshire RG11 2QT
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AMX ART

AMX MOUSE

The AMX MOUSE is an advanced opto-mechanical device which brings to the B.B.C. micro facilities hitherto only available on more expensive machines. It enables you to use advanced features such as ICONS, WINDOWS, and POINTERS in your own programs.

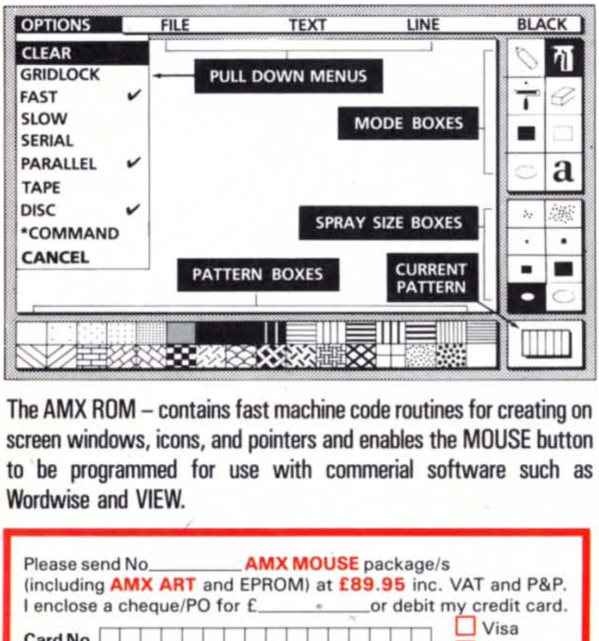
The AMX MOUSE can be used with ordinary programs to replace the cursor keys and with the AMX software it turns the B.B.C. micro into a far more user-friendly device, enabling beginners to quickly learn to use the computer for a wide range of purposes, including COMPUTER AIDED DESIGN, Word Processing, and a host of business uses – to say nothing of its inclusion in games software.

A further range of software will be released in 1985. Starting with "DESK TOP MANAGER".

THE AMX MOUSE PACKAGE

The AMX MOUSE – an advanced three buttoned mouse which simply plugs into the B.B.C. user port drawing its power from the computer.

AMX ART GRAPHICS PROGRAM



The AMX ROM – contains fast machine code routines for creating on screen windows, icons, and pointers and enables the MOUSE button to be programmed for use with commerial software such as Wordwise and VIEW.

Please send No._________ **AMX MOUSE** package/s (including **AMX ART** and EPROM) at **£89.95** inc. VAT and P&P.
I enclose a cheque/PO for £_________ or debit my credit card.

Card No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ ☐ Visa ☐ Access

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(Please tick choice of media for AMX ART) ☐ Cassette ☐ 3" Disc ☐ 5¼" Disc

To: Advanced Memory Systems Ltd., Woodside Technology Centre, Green Lane, Appleton, Warrington, WA4 5NG, England.

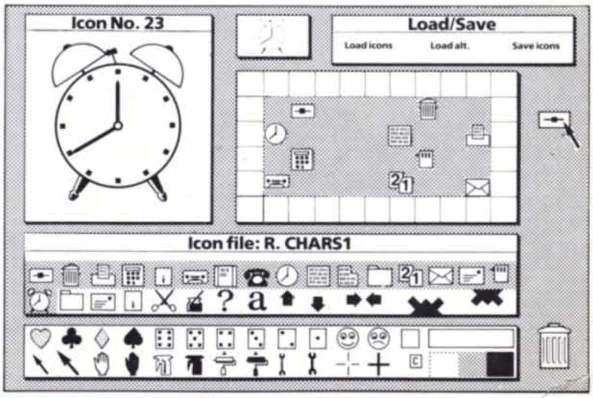
If not available from one of our main dealers, fill in the coupon and we will send you an AMX MOUSE with AMX ART with our full no quibble money back guarantee. OR phone 0925 602690/62907 for instant Access or Visa orders.

A MANUAL describing how to operate the MOUSE and the ROM routines which are available in both basic and machine code programs.

AMX ART – a superb computer aided drawing program on both tape cassette and a 5¼" floppy disc with its own manual. It is suitable for a wide range of uses including preparation of illustrations, architectural and engineering detail drawings, teachers' worksheets, and just creating your own pictures. It soon becomes addictive.

AMX ART includes full use of on screen menu boxes, icons, and pull down menus so that beginners find it very easy to learn and gain confidence in the use of the B.B.C. Micro.

An ICON DESIGNER program which enables you to create and store icons for use in your own programs.



ICON DESIGN PROGRAM

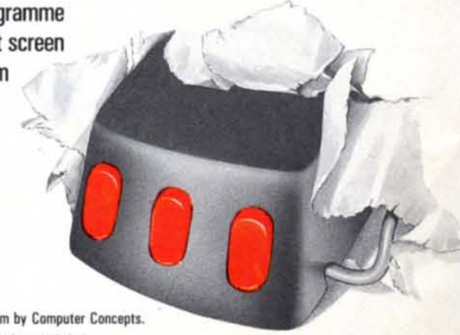
TECHNICAL REQUIREMENTS

The AMX MOUSE can be used with any B.B.C. Model B computer fitted with the Operation System 1.2 and is compatible with the second processor and disc or tape filing systems.

The AMX MOUSE is adjustable for sensitivity via software control and three buttons can be programmed to simulate 24 different key codes.

The AMX MOUSE may be disabled by a simple software command and will then not interfere with normal operation of the computer.

The AMX ART programme enables users to print out screen displays using any Epsom compatible dot-matrix printer. Owners of non-standard printers may use their own screen dump routines.

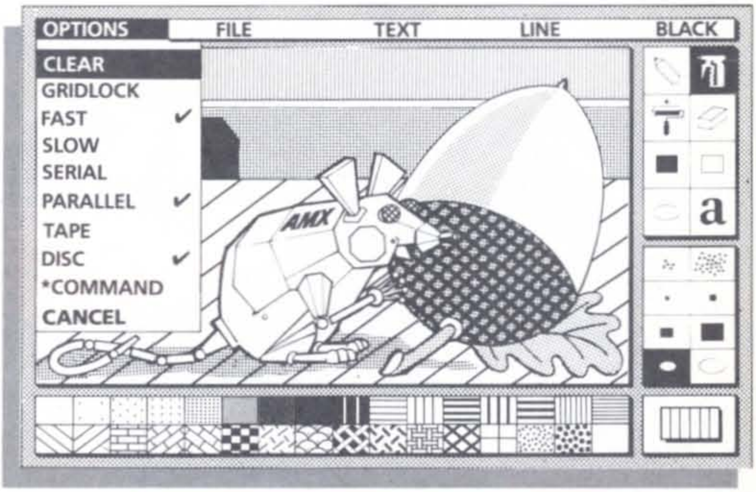


'Wordwise' is a wordprocessing program by Computer Concepts.
'View' is a word processing program by Acornsoft Ltd.

AMX MOUSE

POINTS THE WAY

FOR THE BBC MICRO MODEL B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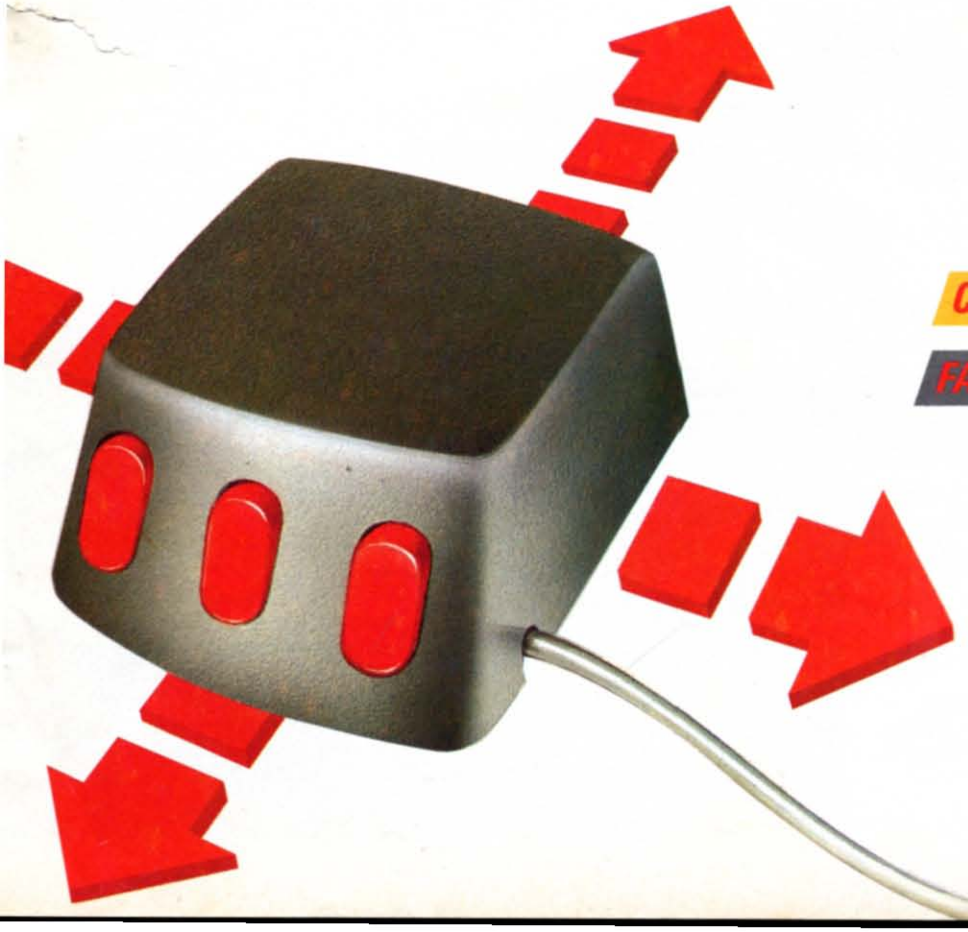
*COMMAND
CANCEL
AMX
a

with AMX ART GRAPHICS PROGRAM



ICON SOFTWARE

CREATIVE GRAPHICS

FASTER INTERACTION

TAKE A TEST FROM THE RANGE

PEN DOWN
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CUMANA
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1
THE MARK OF SAFETY
CUMANA
DISK DRIVE GUIDE

BE SAFE NOT SORRY

Cumana's CS range of single disk drives have been subjected to the strict safety demands of the BEAB.
They have now been awarded BS415 approval, so if you value safety do not trust it to anything less than Cumana.
Cumana's dual range of disk drives have also been submitted for approval.

So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disc drives, Cumana now have other products on offer, all to the same exacting standards that have made their disc drives the number one choice in the home and in education.

The Touch Pad

The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

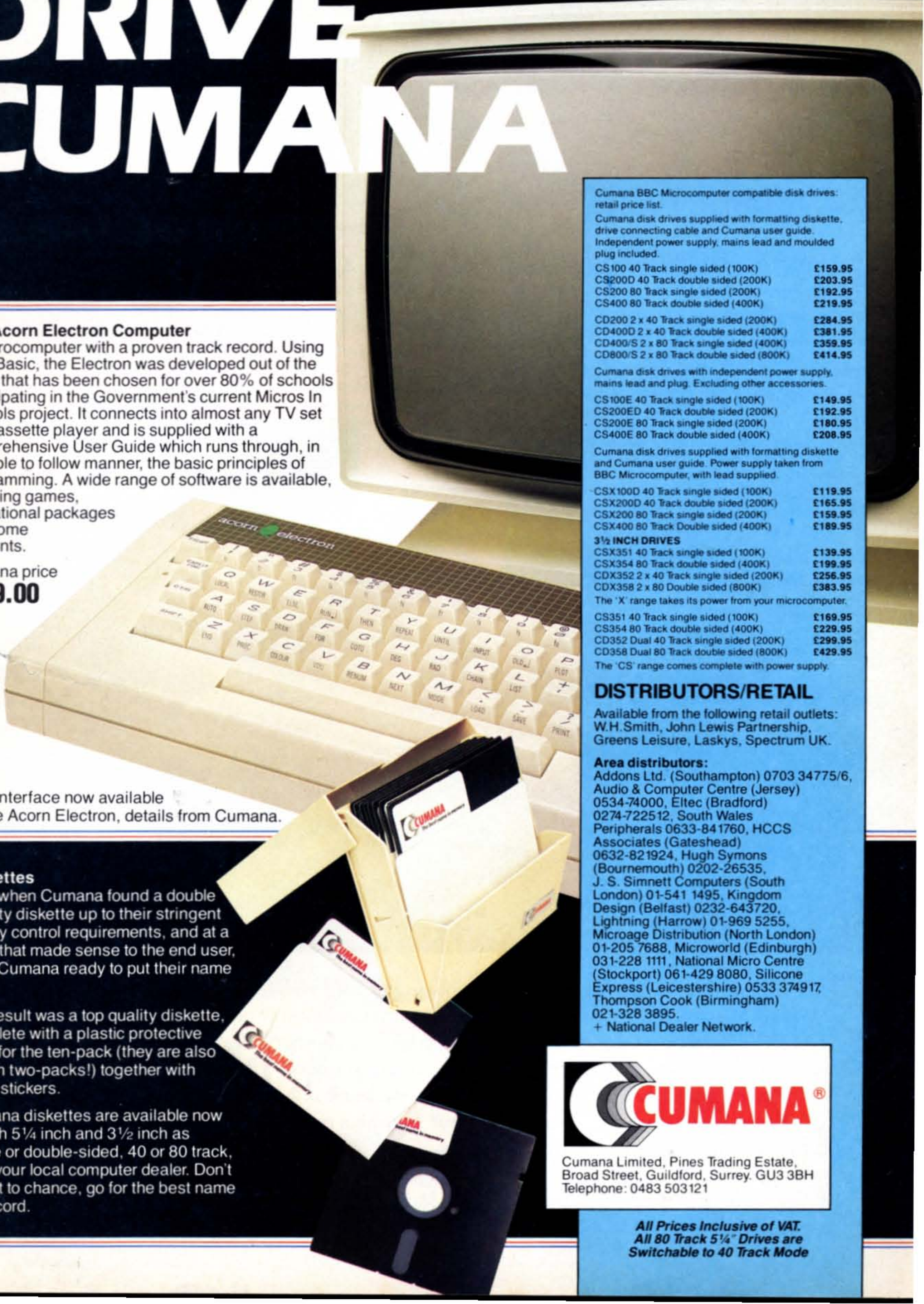
The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

£69.95
including VAT.

Disc Drives

Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models I, III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disc drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.

DRIVE CUMANA



The Acorn Electron Computer
A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Cumana price
£199.00

Disk interface now available for the Acorn Electron, details from Cumana.

Diskettes
Only when Cumana found a double density diskette up to their stringent quality control requirements, and at a price that made sense to the end user, were Cumana ready to put their name to it.

The result was a top quality diskette, complete with a plastic protective case for the ten-pack (they are also sold in two-packs!) together with index stickers.

Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

Cumana BBC Microcomputer compatible disk drives: retail price list.

Cumana disk drives supplied with formatting diskette, drive connecting cable and Cumana user guide. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	**£159.95**
CS200D 40 Track double sided (200K)	**£203.95**
CS200 80 Track single sided (200K)	**£192.95**
CS400 80 Track double sided (400K)	**£219.95**
CD200 2 x 40 Track single sided (200K)	**£284.95**
CD400D 2 x 40 Track double sided (400K)	**£381.95**
CD400/S 2 x 80 Track single sided (400K)	**£359.95**
CD800/S 2 x 80 Track double sided (800K)	**£414.95**

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E 40 Track single sided (100K)	**£149.95**
CS200ED 40 Track double sided (200K)	**£192.95**
CS200E 80 Track single sided (200K)	**£180.95**
CS400E 80 Track double sided (400K)	**£208.95**

Cumana disk drives supplied with formatting diskette and Cumana user guide. Power supply taken from BBC Microcomputer, with lead supplied.

CSX100D 40 Track single sided (100K)	**£119.95**
CSX200D 40 Track double sided (200K)	**£165.95**
CSX200 80 Track single sided (200K)	**£159.95**
CSX400 80 Track Double sided (400K)	**£189.95**
3½ INCH DRIVES	
CSX351 40 Track single sided (100K)	**£139.95**
CSX354 80 Track double sided (400K)	**£199.95**
CDX352 2 x 40 Track single sided (200K)	**£256.95**
CDX358 2 x 80 Double sided (800K)	**£383.95**

The 'X' range takes its power from your microcomputer.

CS351 40 Track single sided (100K)	**£169.95**
CS354 80 Track double sided (400K)	**£229.95**
CD352 Dual 40 Track single sided (200K)	**£299.95**
CD358 Dual 80 Track double sided (800K)	**£429.95**

The 'CS' range comes complete with power supply.

DISTRIBUTORS/RETAIL

Available from the following retail outlets: W.H.Smith, John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK.

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+ National Dealer Network.

CUMANA®

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Telephone: 0483 503121

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All 80 Track 5¼" Drives are Switchable to 40 Track Mode

The chip, of course, is the 8088 as used in the IBM® PC. The operating system is customised to MS™-DOS compatibility. The user memory is 256K RAM, that's four times as much as big brother. The floppy disc storage is 720 Kbytes, that's more than double the basic PC. We've only got two expansion slots, but there again we use them for expansion and don't need to tie them up with basics such as colour graphics or printer ports.

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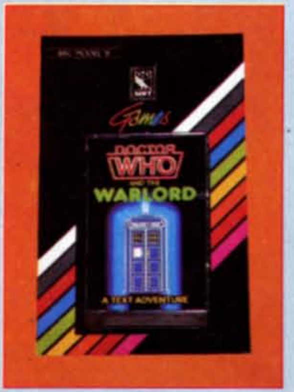

Doctor Who and the War Lord
An intriguing text adventure featuring the quirky and irrepressible Doctor. It increases in difficulty as the adventure unfolds, presenting a real challenge to the player.
BBC Model B: Cassette
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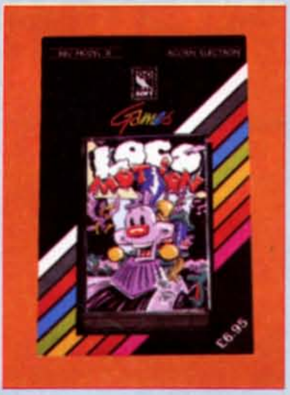

Loco Motion
A remarkable animated game that gives the player control of a train travelling around an extensive network comprising about 50 screens.
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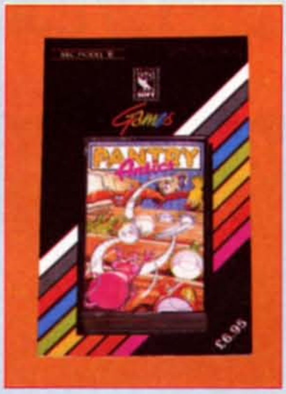

Pantry Antics
A fast, amusing and addictive game. The player takes the part of a mischievous mouse, running along the pantry shelves and earning points for each piece of crockery knocked over.
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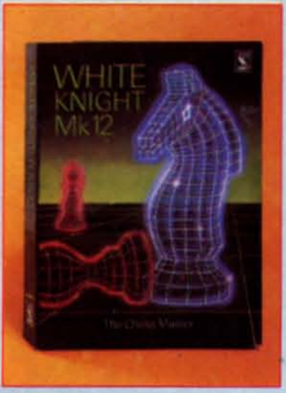

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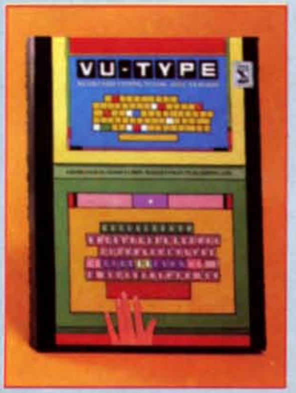

Vu-Type Disc
Vu-Type is an exciting personal aid that teaches you to touch-type without tears, using colour graphics, sound and musical tones. It is now available in a disc based version.
BBC Model B: Disc
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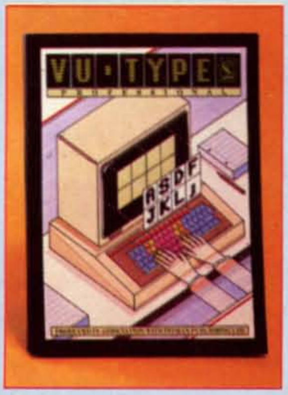

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BBC Model B: Disc
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Prices include VAT. Available from booksellers and computer shops.

THE MICRO USER
NEWS
FEBRUARY 1985

ELITE STATUS SWAPS MISS £100 POINT...

MICRONET claims to have uncovered a thriving status swapping trade among bulletin board operators chasing the £100 of software offered monthly to players of the cult game Elite.

Sysops are said to be offering the chance to download successfully completed chunks of the game as a short cut toward high status and a chance of the prize.

But Acornsoft has labelled the electronic cheats fools to themselves if they use this method to try and win the software.

Micronet says: "We've heard of several instances of a group of players pooling their saved identities – obtained by saving the game on cassette after a session – so as to get a leg-up toward Elite status and, of course, the big monthly prize.

"The situation has become so rife that mere ID tape and disc swapping has been augmented by up and down loading of relevant files on bulletin boards".

However, an Acornsoft spokesman said: "Players who do this are cheating nobody but themselves.

"They are doing very little to enhance their prospects of winning the monthly prize, and they are robbing themselves of the pleasure of playing the game.

"Winners are chosen on the merits of the stored position cassette they have to send to us – not solely on their status in the game.

"It's not a question of whether they have won or lost, but how they played the game".

Acorn's American operation slashed

ACORN has slashed its operations in the United States following "poor sales" of a specially configured version of the BBC Micro.

The company has now given up its plan to capture 10 per cent of the lucrative American educational market – at least for the time being. And it has lost in the region of £6 million in its unsuccessful attempt.

In all Acorn spent some £500,000 promoting the BBC Micro States-side during 1984.

The company also paid more than £300,000 for the US rights to the BBC's educational series linked to learning about the machine, which was shown on the American Public Broadcasting Service.

However an Acorn spokesman denied newspaper reports that the withdrawal would be total.

"We haven't pulled out altogether", he told *The Micro User*. "The fact is we have now tailored the size of the operation out there to meet the present requirements".

Acorn is to maintain a skeleton staff of five to service customers after closing its Boston warehouse, so making most of its 40 local administrative and marketing staff redundant.

And it will retain its small research facility in Palo Alto, California, while relying on US companies to tie up the distribution loose ends.

Approved

Acorn blames its failure to penetrate the US market in the main on delays in obtaining approval from the US Federal Communications Commission.

A change in rules by the FCC at a late stage was the final blow.

"We were ready to get off to a quick start when they announced that the guidelines had been altered", said the Acorn spokesman.

"This delay enabled the American competition to catch up with us by launching an aggressive marketing campaign. Up until then we had faced no real competition.

"Our initial campaign woke them up to the potential of the market".

They dealt Acorn a fatal blow by flooding the schools with free machines.

Acorn had been particularly keen to make inroads into the US market following its success in the British educational scene over the last five years.

But despite its disappointment, Acorn has not given up all hope of making it in the States. It may well attempt to secure a further foothold at the end of the year with a number of new products.

"The game is not over yet", said the Acorn spokesman.

Enter the BBC butler

THE complete home environment may soon be controlled by a BBC Micro – in the role of electronic butler.

Acorn is playing its cards close to the chest over reports about a new computerised controller for home central heating and lights.

Contacted as *The Micro User* went to press, a spokesman said he was unable to reveal any details of the device.

But it is believed it will be based on a 16 bit chip. This will emit high grequency bleeps through the building's 13 amp power circuits.

On/off instructions will be coded in binary, with a unique address code for each piece of equipment.

It is also thought there will be a microchip inside the 13 amp plug at the remote appliance to do the actual switching on and off.

These developments are regarded as a significant step on the road to the computerised home of the future.

BBC Micro in deaf network

A DEAF young Leeds mother has called on the Government to provide financial assistance to enable similarly handicapped people to benefit from electronic mail.

Doreen Naylor, who has been deaf since birth, makes the appeal in a new book, Micros for the Handicapped.

"Having seen the transformation in hearing impaired people on being able to use the telephone via the micro, I feel that financial consideration should be given to use this aid", she writes.

Easiest

Doreen Naylor currently runs her own network linking deaf families in Leeds and Bradford based on a BBC Micro.

She operates this using the Nightingale modem and Commstar.

She singles out Commstar in particular as being "a must" for deaf people.

"Having tried various terminal programs I have found this to be the easiest to use, specially for the deaf who are new to this form of technology", she said.

Doreen Naylor is just one of several handicapped people who have written first hand accounts for Micros for the Handicapped.

Published by Helena Press of Whitby, North Yorkshire, it carries a foreword by Baroness Masham of Ilton.

RELIABILITY REPORT COMES UNDER FIRE

A REPORT claiming the BBC Micro is the second most reliable micro available in the UK – after the Electron – has come under fire.

Critics were quick to cast doubt on the findings after it was learned that Acorn has strong links with the publishing house that commissioned the survey.

However Acorn has strongly defended the results, which reveal that the failure rate for the BBC Micro – based on faulty machines returned to dealers – is only five per cent.

And this takes it into second place in the most-reliable stakes, only one percentage point behind the Electron whose failure rate – according to the survey – is only four per cent.

"The survey is as reliable as it could be", an Acorn spokesman told *The Micro User*. "It's just a pity that some people are trying to suggest it is biased".

It wasn't what the report stated about Acorn products which has caused the attack – but the way it slammed other leading micro manufacturers.

The survey roasted Commodore for its "high failure rate", claiming 18 per cent of Vic 20s and 13 per cent of Commodore 64s are returned to dealers.

But it was Sinclair Research which was named as "the worst culprit". According to retailers interviewed, more than a quarter of all Spectrums sold are returned.

And it was Sinclair, understandably smarting under the criticism, who spearheaded the counter attack.

"We reckon the true return rate is about half the figure given in this survey and 40 per cent of these are in no way faulty", said a Sinclair spokesman.

"And we are not very happy about the manner in which this survey was conducted. It appears that a number of retail store managers were simply telephoned and quizzed on home micro return rates.

"We also believe that the survey was carried out on behalf of a company in which Chris Curry has an interest".

The survey was commissioned by Venture UK, a magazine run by Redwood Publishing, a company in which Acorn's managing director Chris Curry and Chris Ward, an Acorn non-executive director, both have substantial interests.

"But no matter who called for the report in the first place, we still insist that it is as accurate as any other similar survey would be", said the Acorn spokesman.

"The results for the Acorn products were almost identical to ones we've had from our own internal studies. So that satisfies us as to its validity".

Shares slump

FOLLOWING reports of Acorn's massive cutback in the USA, the company's share price slipped to one third of its previous high on the Unlisted Securities Market.

A spokesman admitted that Acorn had scaled down its US operation by four fifths after fierce competition from native companies.

But he denied that share prices had been influenced by this.

"There are two reasons for the drop", he said.

"One is that US sales of home micros have been declining, and consequently investors think it will happen over here next.

"The other is that they have the idea all companies on the USM will double their size every year. But as Acorn is easily the biggest company on the USM, it is much less likely to show exponential growth".

Adventure in education

THE first of a planned series of adventure style educational programs for eight to 14-year-olds has been released by Selective Software.

The Music Box is a mathematical adventure for the BBC Micro containing two main programs for learning, direction and movement, using the concepts of compass points, vectors and bearings.

The plot revolves around the search for two keys to an old music box, and is set in two time zones, the Wild West and the days of sail and trading.

A booklet outlines additional work that can accompany the program to provide a project involving a number of subject areas.

SHOW STAR

TINY two years old Claire Hirst became a child celebrity overnight after she opened the latest Electron and BBC Micro User Show in Westminster.

Although Claire cannot read or write yet, she is already a child prodigy on the computer.

National newspapers, television and radio all converged on the New Horticultural Hall to watch Claire go through her paces.

And she duly obliged by demonstrating how she had written a tune on the micro and even designed a Christmas card.

Score:000120

Classroom network for the BBC

A CLASSROOM networking system has been developed for the BBC Micro by Symbiotic Computer Systems.

Controller programs are compatible with Acorn's own operating software for the machine.

Symbnet is constructed to allow shared disc drives and printers between users.

Full printer spooling is implemented, which means a whole class can use information stored on one hard disc. Password protection ensures confidentiality.

Maximum distance between two computers – or stations – is 9km achieved by fibre optic cable links. The system can thus be used over a whole building or between two or three closely linked.

Every computer within the network has access to it – none are tied up exclusively in controlling disc drives and other devices.

Electronic mail is provided as part of the system.

Messages may be sent via a central network unit where they are stored until read or deleted.

Symbiotic's move follows quickly on the heels of Schoolnet, recently launched by GSL – Geophysical Systems Computers Limited.

This network comprises six BBC Micros with a 10.5mbyte Winchester, two disc drives and printer.

More floppies may be added, and the Winchester upgraded to 280mbytes.

Also planned is the ability to add other makes of micro, data communications, viewdata interface, access to electronic libraries of educational software and Z80 and CP/M compatibility.

Meanwhile, Richmead Micro has come up with Meadnet – a school network system that allows 16 BBC Micros to be connected to a single RML 380Z – allowing common access to the RML's disc drives and printer.

This system has been tried out in Berkshire, and already one school out of every four in the county is using it, says Richmead.

A weekend away with your BBC

FANCY a weekend in the country but can't bear to be parted from your Beeb? Don't worry, your problem has been solved.

On six weekends between now and the end of November, BBC Micro users are being invited to spend two nights at the 15th century Three Crowns Hotel at Chagford, Devon.

The weekend breaks are a joint venture by Colin Chatfield, director of software house Micro-Aid, and innkeeper John Giles – himself a BBC Micro enthusiast.

Situated within Dartmoor National Park, the hotel is built of ancient granite and massive oak beams, but Giles is right up to date with his Z80 second processor.

Dates are February 15-17, March 15-17, April 19-21, September 20-22, October 18-20 and November 22-24. Cost is £89 for two.

Packaging brings a business boost

A NEW packaging design for the BBC Micro has given a major boost to its future as a business tool.

The tills at West Yorkshire computer firm UCC have been ringing merrily since it began producing its range of Oak systems based on the Model B.

"We smartened up the BBC Micro and the effect has been amazing", said UCC director Dave Aitken.

"It has always been an excellent machine – which is why we chose it to base our product on – and its range of add-ons is great.

"But frankly when units and cables are assembled to give it a business function it looks a mess. Basically we've made the machine more businesslike in appearance and it has had a dramatic effect on sales. Firms are now buying it because it looks efficient".

Aitken's company sells a range of seven Oak packages priced from £110 for processor and keyboard cases for those who already own a BBC Micro up to just under £1,500

One oi the most popular packages costs £1,095 and includes processor case, keyboard case, keyboard and motherboard, disc interface, two 1mbyte drives and an 85 watt power supply unit.

"Neatness in appearance is proving a big selling factor", says Aitken.

Tracker with a military past

A TRACKER ball cursor controller for the BBC Micro has been brought out by Marconi Electronic Devices at £59.50.

Developed from MED's military and air traffic tracker ball controllers, the device is aimed at the serious computer hobbyist, educational establishments and CAD/CAM applications.

The RB2/PC-1 comes with utilities software on tape allowing joystick programs to be run and push button functions to be defined. Included is a drawing program directly controlled by the tracker ball.

Teachers launch school database

THREE teachers trading as Toad Educational Computing have launched a disc database specially for schools.

They say it contains routines unobtainable with other packages.

All pupil records can be stored and accessed including fields for names, addresses, date of birth, contact information, classes, option groups, medical details, test and examination results, internal reports and so on.

The fields are set up by the user and up to five screens of information can be used for each pupil. A 40 track disc will hold an average of 500 records of reasonable length.

File creation is controlled by the user, as is the screen display of information. A security code can be used for restricted access.

Records and fields can be searched for matching strings, for any occurrence of a set of characters, for specific string positions, or numerically for greater than, smaller than or equal to.

Sorting can be alphabetic, numeric or in date order and the final printout can include any amount of extra information.

After searching various other options are available – the calculation and printout of chronological ages, calculation of most of the information needed for Form 7 and the printing of mailing labels.

There is also the facility to load previously created Wordwise letters for the automatic insertion of details from your search and the program contains a simple word processor for creating letters and lists which can be merged with information from the search and sort routines.

Also offered is Pixel Plotter which can be used to create teletext type news pages, computer work cards, information sheets or computer art.

MICROWORLD

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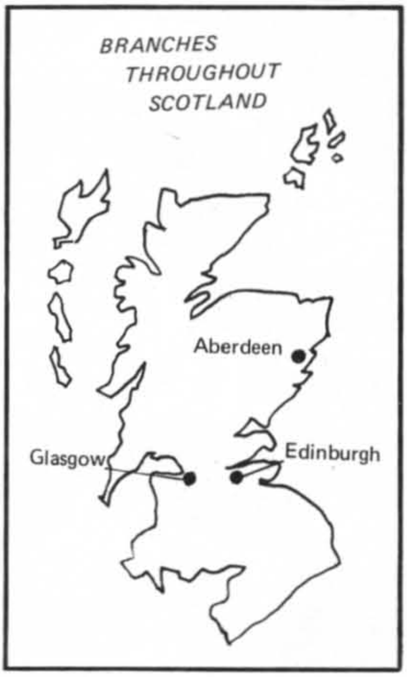

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Softlife
numeric keypad

Numeric keypad

THE first numeric keypad for the BBC Micro has just been released by Softlife. The unit plugs into the user port and needs no external power supply. Software, provided in eprom, uses only Acorn approved calls. It uses no user RAM in standard mode. An optional fully programmable mode is also available. Price £60.

£50 modem makes London show debut

THE long-awaited £50 modem finally limped onto the Unicom stand at the Electron and BBC Micro User Show in London.

But, despite promises, there were none for sale.

In fact, two working examples appeared, but one was swiftly sabotaged by the eager fingers of the large crowd.

Rumours of production delays to the modem were cheerfully confirmed by Unicom director John Jones.

"We had trouble with a printed circuit board. It failed, and we had to develop a new one", he told *The Micro User*.

He said he was "quite confident" that as many as 1,500 would be with customers my mid January.

But just in case some people who had ordered a modem were getting impatient he was writing to them all giving them the option of having their money back.

On the sales front, Jones predicted a bumper 1985.

"We are a marketing organisation", he said. "We identified a need, and are now manufacturing to fulfil it".

But modems were not the only attraction at the show. Two hard discs for the BBC Micro were unveiled – from Akhter and Quest International.

The Akhter unit had a 10mbyte Winchester and 1mbyte floppy at £1,000. Quest's Firefly hard disc was a bit cheaper, but with only 7.5mbytes.

Also attracting interest was Acorn's Music 500 synthesiser, equipped with a basic set of 16 sounds, plus a battery of electronic sound-making techniques.

Electronic music was certainly well to the fore. Island Logic's Music System fascinated a section of the crowd who saw themselves rivalling Paul McCartney – and a like number clustered round Clef Products' professional music system.

Further products from Acorn included ABC – a word processor for young children – and Talkback, which allows children to create their own computer "people" capable of holding on-screen conversations.

Computer Concepts unveiled their ROM-based Wordwise Plus word processor and a super disc version called Hi Wordwise. Existing Wordwise users can move up to the plus version for an extra £17.

Educationalists at the show were drawn to the Bel Tech stand.

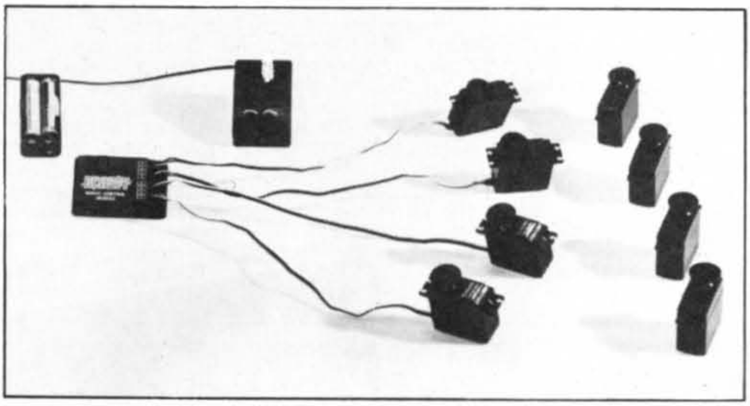
According to Bel Tech's David Lane, most interest centred on Bel Plot, which takes numerical data like statistics or experiment results and turns them into an on-screen curve, plus an equation.

Robotics by remote

A ROBOTICS remote control system for the BBC Micro has been launched by Commotion.

The Infra-Red Beasty is fully compatible with the Beasty arm and Mobile Base. It will control up to eight servo motors within a minimum range of six metres.

Commotion says it will cost less than £50.



'Improving' software

SELF improvement, home improvement and practical knowledge are the themes of a new range of software from Blandford Books. Each package contains a program and a copy of the book on which it is based.

Introducing the Dots is based on rock musician Dave Stewart's book and teaches how to read, write and arrange music.

The Love Oracle is based on Guy Damian-Knight's The I Ching on Love and probes the user's love life.

The BBC Micro version of both programs cost £14.95.

Mice breeding fast!

YET another mouse-like peripheral has been produced for the BBC Micro. This time it's the Wigmore Trackball and it costs £29.90.

Simple fingertip movement provides directional change and start-up. It uses the standard joystick port on the micro so that existing joystick software can generally still be used.

The Trackball is claimed to be more precise and stable than a joystick, with no zero point drift. It also needs less desk space than a mouse and can even be operated from the lap, says Wigmore.

Apart from games, it can be used for drawing, graphics, CAD, education and other cursor control applications.

Two optional packages are offered, Trackpaint – a cassette based, introductory graphics software package and Cadtrack – which is a disc based icon driven graphics package.

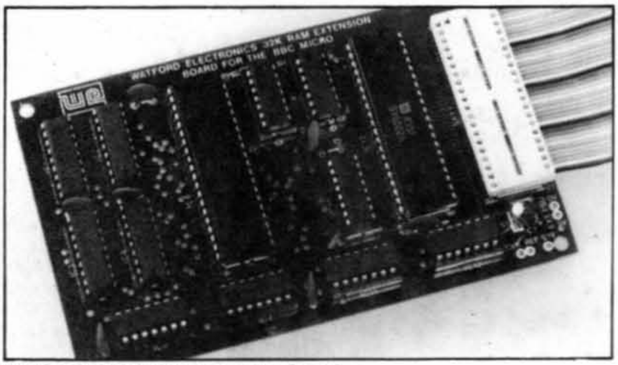
Astray...

ONE of *The Micro User's* mail order offers went sadly astray recently.

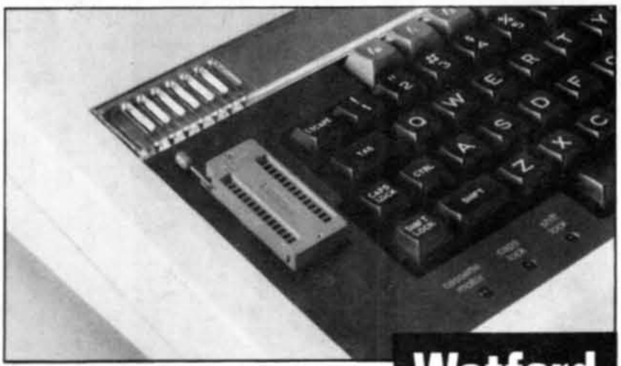
While winging its way – literally – to a Scottish reader, a Micro Olympics game ended up on an exposed hillside along with a ton of other mail after the aircraft crashed.

The weather was "so atrocious", says the Inverness postmaster, that it took his men 48 hours to retrieve the mail.

However, says the reader, the game still worked perfectly.


WATFORD ELECTRONICS 32K RAM EXTENSION BOARD FOR THE BBC MICRO

Watford's 32k RAM expansion board ...



... and the new external ROM socket

Watford at the double!

TWO new add-ons for the BBC Micro come from Watford Electronics – a 32k RAM card and an external ROM socket.

The 32k expansion board, fitted internally, has the following advantages, says Watford:

- Its top 20k can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage.
- The full 32k or the bottom 12k can be used as a buffer for the printer, sound channels, RS423, keyboard or speech synthesiser.
- When word processing, there is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on.
- The ROM requires one page of workspace, so the Basic variable PAGE is increased by 256 bytes. Problems are overcome by a facility to place the workspace in an unused area, thus giving the user even more room.

The expansion package costs £69, with user manual and firmware.

The ROM board consists mainly of a zero insertion force (ZIF) socket on a small circuit board on the left of the keyboard, connected to one of the internal ROM sockets. No soldering is required.

The ZIF eliminates damage to the ROMs during insertion and removal.

All data and address lines are terminated to ensure correct operation of suitable ROMs with the BBC Micro.

Price £16.

Whatever the language ...BBC has the answer

Network at polytechnic

THE department of language studies at Coventry's Lanchester Polytechnic is using a network of BBC Micros for computer aided learning in the main European languages.

Authoring packages have been developed for use with English, French, German, Spanish and Russian texts which can be chosen by the teacher to cover any topic at any level of difficulty.

Programs have also been written to enable the word processor View to be used for texts in these languages giving a full range of accents and special characters on the screen and on an Epson FX80 printout.

They include the full Cyrillic upper and lower case character set for Russian text.

Software is available on 40 or 80 track discs and works with OS 1.0 or 1.2 and Basic I or II.

Francais – très bon!

'ALLO. 'Allo. You weesh to parlez Français très bon? In fact, bon enough to passez le 16 plus examination or l'O level?

Dean Associates of Sheffield is offering a French revision package made up of four units, each requiring at least four hours' study time.

There's a keyboard introduction to explain special features like the ability to enter accents.

Diagnostic testing, graded levels of difficulty and the display of student scores are also included in the package.

The development team for the project was made up of a senior O level French examiner, French teachers and a native French speaker.

Both cassette and disc versions are available, and grade units can be bought singly, in pairs or as a complete set.

Prices start at £9.95 for a single grade on cassette.

SPARKS FLY!

SPARKS fly in Statix, Psion's new arcade game for the BBC Micro.

The program, suitable for joystick or keyboard control, tests ingenuity and reaction times as players try to outsmart the Statix – a dangerous electric charge.

To gain control of the screen, players must draw new boundaries – a risky business as the Statix prowls in defence of its territory.

Each new magnetic field reveals a more powerful, agile and aggressive Statix, crackling with high tension.

Price is £7.95.

EPROM CHECKER

AUTOMATIC detection of mis-inserted or damaged eproms is a feature of a new eprom programmer from Control Telemetry.

The software supplied to drive the hardware from the BBC is held in ROM. The various commands and editing functions are said to have a consistent structure which, together with the use of function keys and prompts, makes the system easy to use.

The full screen editor maintains a scrolling window of the eprom image in RAM at all times to mirror the changes and edits being made.

The unit costs £95 and special discounts are offered to schools.

The Ergon computer trolley

Micro trolley

TIRED of trailing cables and tangled leads? Ergon Structures has designed a trolley for the BBC Micro that should solve the problem.

It has a continuous slot in the top surface through which all plugs, cables and leads can pass to prevent them hanging loose.

A single power cable, which stows neatly round a "mushroom" on the end panel, feeds a 4-gang socket block securely fixed inside the trolley.

HIGH RESOLUTION
JVC COLOUR MONITOR
£249.95
(INC. VAT.)
BRIGHTNESS
OFF ON
RGB COLOR

HIGH RESOLUTION THAT COMES HIGHLY RECOMMENDED.

"There is no doubt that the JVC range of ECM colour monitors is excellent value for money . . . there is no loss in quality of picture after long periods . . . and remember, as more and more resolution is available with new micros, the need for a better display will be that much greater."

High recommendation indeed from Personal Computer News. Meanwhile Acorn User said:

"It seems that all 'normal' and 'medium' resolution monitors, including the Sanyo, are simply inadequate to deal with the Beeb's graphics and text output . . . The JVC was excellent, giving clear, legible results . . . Was the JVC better than the Microvitec?* Would I buy one? Yes to both questions."

Our RGB high resolution colour monitor (580 × 470 pixels) sells for £249.95 (including VAT) – that's a saving of over £100 compared with other leading monitors of similar specifications.

The unit has a 14" screen and is suitable for the BBC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM and most other leading micros.

STOP PRESS:

PRICE INCLUDES VAT, LEADS AND CARRIAGE.
THIS IS THE LOWEST PRICE ON THE MARKET, FOR IT'S PERFORMANCE.

And naturally there's a year's full guarantee.

If you order your monitor by post, you'll receive it within ten days by courier service.

Simply post the coupon below to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or telephone 01-701 8668 quoting your credit card number. Or, of course, you can buy at our showroom between 9.00–5.30pm, Monday to Friday.

*Microvitec Cub 14" monitor.

To: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE.
Please send me:
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______ Medium Resolution Colour Monitor(s) at £221.95 (inc. VAT)

I enclose a cheque for £______ Or please debit my credit card account with the amount of £______ My Access/Barclaycard (please tick) no. is ______
Please state the name of your computer ______

Name ______
Address ______
______
Postcode ______
Telephone ______
______

Opus.
Opus Supplies Ltd.

BU8

Waiting for technology to catch up...

THE first home computer game from Complete Microcomputer Services is based on a 20-year-old idea that has had to wait for technology to catch up with it.

Lingo was invented by Alan Wakeman in the 1960s when he was teaching English to foreign students. "It lay in my ideas file for years, gathering dust", he says.

The micro revolution has brought Wakeman and CMS boss Russell Altendorff together in what they hope will be a profitable venture.

Lingo, which can be played by up to four people at once, literally makes fun of the English language.

The computer deals each player 12 random words, displays a pool of terminations, articles and conjunctions and leaves players to make up surrealistic sentences, awarding marks for ingenuity.

"The sentences must be meaningful and grammatical – and players are encouraged to challenge each other if they aren't", explained Wakeman.

"But the real fun lies in the extraordinary or just plain silly expressions which players find themselves inventing".

Wakeman sees the game as being an antidote to the solitary nature of most computer programs.

"I think parents are fed up with their kids going off in a room to play computer games by themselves", he says.

"Lingo can be played alone, but it is much more enjoyable when played with others – a family is the ideal set-up.

"And it also helps people learn about the grammar and construction of the English language in a new way.

"Imagine schools having a teaching aid that students will fight to be allowed to use during lessons", he said.

Price is £12.95.

Machine tool role for BBC Micro

THE BBC Micro is rapidly becoming the standard microcomputer in colleges and schools teaching computer control of machine tools.

The latest product in this field, from Feedback Instruments, allows the BBC Micro to act as a controller for the CNC932 coordinate drill.

This computer numerically controlled machine tool is already being used on BETEC and City and Guilds courses.

The manuals supplied have allowed students to use it either as a computer application or as a training vehicle to learn computer numerical control (CNC, as it is known) of machine tools.

The new manual is for those interested primarily in CNC work and explains basic CNC terms.

A series of exercises allow students to acquire the skills of CNC by entering, editing and listing part-programs in internationally recognised languages using a keyboard and symbols similar to those on a full-sized industrial machine tool.

The disc contains a program allowing a BBC Micro to act as a CNC controller.

Feedback's CNC932 is an accurate bench-sized model of a coordinate drilling machine which does not require a dedicated computer.

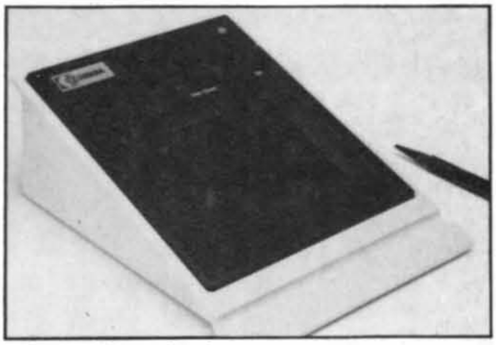
Price is under £700 and discs cost £30 to £40.

● Feedback Instruments has also extended its range of microprocessor applications modules by the production of an all purpose disc for the BBC Micro.

It is expected to cost about £50 and is aimed at technical training organisations, skill centres and secondary and further education – especially those areas providing vocationally orientated courses.

The new disc contains programs in BBC Basic for all MICA modules for which a program is relevant. The user may return to a displayed menu at any time and select a new program.

It will be possible to add programs when new MICA modules become available.



The CM504 touchpad

NOVEL PLOTTER

DISC drive supplier Cumana, has launched a novel graphic plotting aid for the BBC Micro.

The CM504 is a pressure-sensitive touch pad designed as a mouse substitute or smart keyboard supplement and as a graphic input device. It can also be used for CAD/CAM systems.

The interface is through the RS-423 port. Input is via two software-selectable push-button closures. There is also a pen-up and pen-down indicator.

The coordinate conversion performance is 80 samples per second at 9600 baud. Resolution is 1,000 × 1,000 and linearity is said to be better than three per cent of pad dimension positional error.

First Econet utility ROM

THE first utility ROM for Econet has just been released by Mushroom Computers.

Designed to increase the efficiency of busy Econet systems, the ROM's comprehensive command package includes functions to give the network manager enhanced supervision and control.

For example, in an exam situation a teacher using Mushroom's Net-Nurse could force specific terminals to run a given program simultaneously and invite users to provide an answer.

The teacher can also monitor all screens and break in if a student is going wrong.

Net-Nurse was developed out of Mushroom's own experiences with Econet systems.

"We saw the limitations of file servers and set out to create a ROM containing all the commands we could ever possibly need", said managing director Paul Vaughan.

"Net-Nurse doesn't tie up RAM or a disc drive. It allows quicker, easier access, instant data transmission and with 16 command functions is more versatile.

"We believe it will be a big success in sixth forms, colleges and industry. Several ROMs can be used in one system for even speedier processing".

Net-Nurse costs £29.95 and can be used on its own, with Acorn level One and Two file servers, or with Broadway's Super Level One file server which has been adopted by several local education authorities as a standard.

In pole!

BEST-selling Pole Position from Atarisoft is now available for the BBC Micro.

In this full colour racing game, you're the driver of a Formula One racing car, and you need to muster all your driving skills to get around the tricky circuit.

The game, which can be controlled with joysticks or keyboard, costs £9.99.

Island makes music

THE Music System, a package for the BBC Micro for creating, editing, playing and printing digital music, has been launched by Island Logic.

Claimed to be the most advanced micro-based music program on the market, it consists of five elements.

These are the editor, keyboard, linker, printer and synthesiser.

The disc version, which comes with a separate song and sound library disc, retails for £24.95.

Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

Stays defiantly below the £200 barrier.

Though it has far more than its fair share of features, it maintains the extraordinarily low price of £199.95.

Travels at a steady fifty.

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

Providing bi-directional and logic seeking printing for normal characters and uni-directional printing for super and sub script and graphics.

Prints on any paper.

Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

It will even print two copies together with your original.

A superb character recommendation.

In its price range, the M-1009 has a great deal more character than many printers.

96 no less, plus international type and graphic characters.

Reliability comes as standard.

Built to the same exacting standards as Brother's elite office printers, the Brother M-1009 already has faultless credentials for reliability.

Its 9 pin dot matrix head, for example, has an astonishing 20 million character service life.

One printer that doesn't block out the light.

Many home computers tend to be a little on the large side.

In contrast, the compact M-1009, at only 7 cm high, keeps a discreet profile.

Well designed, reliable – and conscientious.

The Brother M-1009.

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The future at your fingertips.

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BOOTS, WILDINGS, SPECTRUM, JOHN MENZIES, MICRO MANAGEMENT,
MAJOR DEPARTMENT STORES AND ALL GOOD COMPUTER SHOPS.

Now, the BBC

The BBC Micro has now taken a giant step into the world of business computing.

With the addition of its new Z80 second processor, it is the first computer at anywhere near its price to become fully compatible with CP/M software.

As most business computer users can verify, CP/M is the most widely used form of software in business today.

For £399, you're well and truly in business.

At £399, the Z80 adds 64K of usable RAM to the BBC Micro. And it allows you to use the CP/M 2.2 computer operating system.

It's extremely fast.

And besides giving you access to a vast new area of software, it enables you to use GSX graphics–based programs, the perfect complement to the BBC Micro's own superb graphics.

Free software and languages.

The Z80 second processor comes complete with five CP/M business programs.

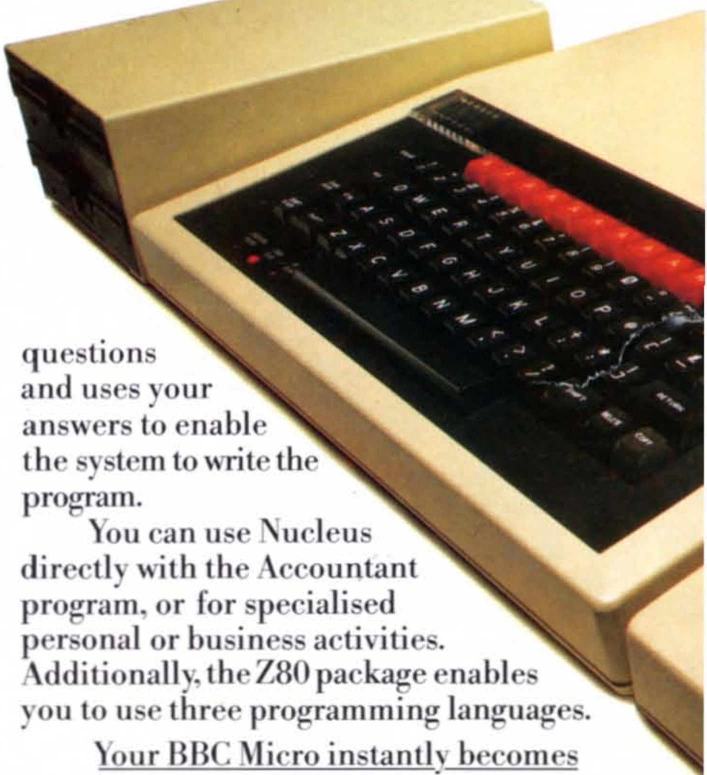
To handle your word processing, there's MemoPlan. It's a program with some highly sophisticated features, such as a safeguard against data loss through power cuts and the ability to show two documents simultaneously on the screen.

To form your CP/M personal database, there's FilePlan. It stores names, addresses, telephone numbers, stock listings and more. And if you use it with MemoPlan, you can generate personalised letters, labels and mail shots.

To produce forecasts and analyse groups of figures diagramatically, simply use the GraphPlan program. This is incredibly helpful in working out vital business calculations, converting them into graphs and charts.

Meanwhile, in the book-keeping department, there's the Accountant program. Use it to enter day-to-day transactions into the computer. Then, at any time, you can ask the computer to produce lists, summaries, reports, audit trails and trial balances. You can readily expand this package to a fully ledger based system, complete with payroll and more.

Finally, to help you to develop your own programs without having specialised experience, the Z80 comes with another software package called Nucleus. It's a system generator which asks you questions and uses your answers to enable the system to write the program.



You can use Nucleus directly with the Accountant program, or for specialised personal or business activities. Additionally, the Z80 package enables you to use three programming languages.

Your BBC Micro instantly becomes multi-lingual.

To simplify writing your own software with the Z80, there's BBC BASIC.

For running professionally written business programs, there's Professional BASIC.

And then there's CIS COBOL, the leading microcomputer version of COBOL, the language used in mainframe computer applications throughout commerce and industry.

With CIS COBOL, the Z80 also gives you two sophisticated programming aids.

CP/M is a registered trademark of Digital Research Inc.

Macro.

One is Animator, an award winning debugging tool which enables you to identify programming errors quickly and easily.

The other is FORMS 2, which helps you to write your own interactive programs in COBOL.

With all these sophisticated features, the Z80 package is exceptional value for money. Indeed, bought separately the programs and languages could cost as much as £3,000.

Z80 second
processor with
CP/M business
package.
£399.
MICROCOMPUTER SYSTEM

See the Z80 at work.

The Z80 second processor is designed to be used with the BBC Micro Model B incorporating a Series 1.2 Machine Operating System and linked to a dual 80-track disc drive, a printer and monitor.

Ask your BBC Micro dealer to show you just how far it can go in the world of serious business computing.

For your nearest dealer, ring 0933 79300.

Technical specification.

The Z80 has a 64K Random Access Memory, running CP/M 2.2 which provides approximately 55K bytes of RAM for user programs.

It operates at a clock rate of 6MHz.

Power supply is integral. Height, 70mm. Width, 210mm. Depth, 350mm.

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

Increase your fire power!

More than just a joystick—a system

- ▲ **Nylon encased—Steel shafted joystick with ball and socket joint.**
- ▲ **Fast sprung return to centre.**
- ▲ **Graphite wiper linear potentiometers.**
- ▲ **12 Months Guarantee.**
- ▲ **7 day Money back Guarantee (on Hardware).**

Complete control at your fingertips

A superb joystick and a keypad for the price of either one. Plus the software to integrate it into the computer's system. One handset will work on it's own in the A/D port as a joystick and two fire buttons. Joystick is immediately compatible with ACORNSOFT and similar software.

The interface joins together the analogue and the user ports to use the full keypads giving a total of 24 user definable keys. The interface can also be used as a splitter for the A/D port to take two items at the same time, e.g. joystick and lightpen.

DELTA DRIVER on cassette or disc: Two programs on each cassette or disc. One converts machine code programs from the keyboard to the joystick or keypad, with adjustable sensitivity on the joystick and will run on any O.S. The second program (needs O.S. 1.0 or later and an interface) duplicates any keyboard keys on the keypads, in the operating system, so that it can become a numeric keypad or will take on the function keys.

Numerous stockists nationwide or direct from us.

SAE for more detailed information.

Made in England

DELTA 14b HANDSET £14.95
DELTA 14b/1 A/D/USER PORT INTERFACE £14.85
DELTA DRIVER CASSETTE £5.95 or DISC £9.95
Prices include VAT and P&P.

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SPECIAL OFFER

BBC Micro
(Model B)
Only: £315

NEW

BBC MICRO
32K + 32K

(includes extra 32K RAM card already fitted)

Only: **£379**

6502 2nd PROCESSOR	**£175**
Z80 2nd PROCESSOR	**£339**

TORCH Z80 DISC Pack	**£695**
TORCH Z80 2nd Processor	ONLY **£295**

(Securicor carriage on Micros £7)

BBC Micro with ECONET	**£375**
ECONET Upgrade Kit	**£55**
File Server Level 1	**£85**
File Server Level 2	**£215**
Printer Server EPROM	**£41**
Terminators (Pair)	**£60**
Clock with PSU	**£35**
10 Station Lead Set	**£25**
ECONET User Guide and Cable	**£10**
TELETEXT Adaptor	**£195**
Acorn Bitstick	**£328**

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies while not in use. **£3.50**

EPSON

● EPSON RX80 Printer	**£209**
● EPSON RX80 F/T Printer	**£219**
● EPSON FX80 Printer	**£316**
● EPSON FX 100 Printer	**£429**
● SEIKOSHA GP100A	**£122**
● Centronics PRINTER CABLE for all the above printers to interface with the BBC Micro.	**£7**

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	**£35**	RS232 + 2K Buffer	**£59**
IEEE 488	**£65**	2K Parallel	**£58**

Type	Ribbons	Dust Covers
MX80FT	£4.75	
MX100/FX100	£10.00	£5.25
FX80	£4.75	£4.95
RX80	£4.75	£4.50
GP80	£4.50	–
GP100	£4.95	£3.95
GP250	£5.95	£3.95
GP700	£18.50	
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75
MICROVITEC MONITORS	–	£5.50

4 COLOUR PLOTTER PRINTER

How often have you wished you had a colour plotter for your computer, but have been put off by their high cost? Well, Watford Electronics can now supply you with a high quality, low cost plotter with Centronics interface. The SCP-800 printer/plotter facilitates plotting and printing in four colours on paper up to A4 size, using easily replaced pens. It can operate in a text mode, performing like an ordinary printer capable of speeds up to 12 CPS with a maximum of 160 characters per line on A4 paper. In graphics mode it offers full plotting facilities including drawing, moving, scaling of text, rotation and drawing of axes.

(Write in for a sample printout). For a COLORDUMP ROM see page 4 of our advert. **Only £175** (£5 carr.)

BROTHER HR-15
DAISY-WHEEL PRINTER

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional printing, proportional spacing, Centronics or RS232 interfaces as standard, optional sheet feeder and an optional keyboard.

ONLY **£329** (carr. £7)

Single Sheet Feeder	**£195**
Electronic KEYBOARD	**£135**
TRACTOR FEED Attachment	**£90**

RIBBON CARTRIDGES:

Fabric **£3;** Carbon **£3;** Multistrike **£6**
DAISYWHEELS (various typefaces) **£18**

Listing Paper (Plain)

1,000 Sheets 9½" Fanfold Paper	**£7**
2,000 Sheets 9½" Fanfold Paper	**£13**
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Teleprinter Roll (Econo paper)	**£4**

Carriage on 1,000 Sheets £1.50

PRINTER LABELS
(On continuous fanfold backing sheet)

1,000 90×36mm	**£5.50**
1,000 90×49mm	**£7.75**
1,000 102×36mm	**£6.25**

Carriage on Printer Paper or Labels £1.50
Carriage on 1,000 Labels £1.00

All prices exclude VAT

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs
2764-250nS **£4.50**
27128-250nS **£13.00**
RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards
6116LP (2K) **£3.50**
6264LP (8K) **£15.00**

FIRMWARE

ACORN 1.2 DNFS ROM	**£15.00**
ACORN 1.2 OS ROM	**£10.00**
ACORN BASIC 2	**£30.00**

KAGA KP810

What do the press say:-
"At £269 this is an unbeatable product for what it has to offer". – Educational Computing.
"Offers excellent value for money". – Electronics & Computing.

This new Japanese printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, Proper adjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY **£242** (£7 carr.)

RS232 interface + 2K buffer to connect to other micros. **£89**

KAGA KP910 PRINTER

Very similar to the KP810 but with 17" carriage for really wide print. Gives 156 columns of normal print or 256 columns in condensed mode. This printer is ideal for printing out spreadsheets and can also be used for correspondence in NLQ mode.

ONLY **£339** (£7 carr.)

PRINTER LEAD

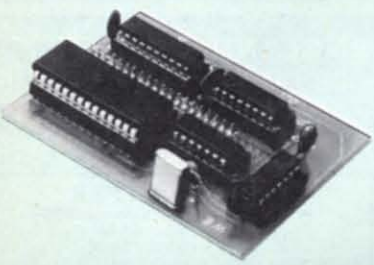
Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	**£7**
Extra long (5 feet long)	**£9**

Continued →

DOUBLE DENSITY

DISC INTERFACE



SIMPLE but SOPHISTICATED

We are proud to bring to you the Watford Electronics Double Density Board for the BBC Micro.
The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.

- Increases storage capacity of your Disc Drives by the maximum physically possible, 80% !!!
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than &3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- The double density system is of course faster than single density.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient – we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs.
(please write-in for full technical specifications)

Complete Unit incl. DDFS ROM	**£85**
DDFS Manual	**£6.95** (no VAT)

We will exchange your existing Single Density Interface for our DDFS Unit for **£49**
(Carriage £1.50)

3M - 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick, disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

● 10	S/S D/D	40 Track Diskettes	**£14**
● 10	D/S D/D	40 Track Diskettes	**£18**
● 10	S/S D/D	96 Track Diskettes	**£22**
● 10	D/S D/D	96 Track Diskettes	**£24**

SPECIAL CALCULATOR OFFER

We are offering a quality slimline pocket calculator, ABSOLUTELY FREE with every box of 10 diskettes purchased during this month. (Offer valid while present stocks last).

THE ULTIMATE DFS FOR BBC MICRO

Watford are proud to be able to supply both SINGLE and DOUBLE DENSITY versions of their highly acclaimed Acorn compatible DISC FILING SYSTEM.

What do the independent press say?

"Good value for money" – Beebug
"A very worthwhile package" – The Micro User
"You'll be buying a very powerful package" – Personal Computer News
"Superior DFS; Excellent disc sector editor" – Computer Answers

Without a doubt the most sophisticated DFS software yet written for the BBC microcomputer. This powerful DFS is fully compatible with the ACORN DFS, yet has much increased power due to the additions, carefully designed to make life easier in normal use. It consists of 16K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

● DFS (Disc Filing System) ROM only	**£26**
● Complete Disc Interface Kit Incl. DFS ROM & fitting instructions	**£115**
● Acorn's DFS Kit complete	**£99**
● ACORN's new 1.2 DNFS ROM only	**£15**
● Disc Filing System Manual (Comprehensive)	(no VAT) **£6.95**

P.S.
We will exchange your existing ACORN DFS for Watford's highly sophisticated DFS ROM for **Only: £18**

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail this product through dealers. Every ROM carries a printed label with our LOGO and a serial number.

THE FEATURES OF WATFORD'S SINGLE & DOUBLE DENSITY DFS.

- The system can either use the ACORN standard 31 files per disc side or DOUBLE THE NUMBER to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

- A FORMATTING PROGRAM is built in, permitting formatting to 35, 40, 80 track formats with either 31 or 62 files. Since the formatter is built into the DFS it can be used without affecting whatever program you are using.

- A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

- A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is extremely useful for recovering accidently deleted files and can save weeks of work.

- A double step mode allows the user of 80 TRACK DRIVES TO READ AND WRITE BOTH 40 & 80 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.

- A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once. Automatic increment function SAVES successively numbered versions of a file, every time SAVE is used.

- When using LOAD, CHAIN etc., it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

- Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address, thus saving a lot of complicated programming. This command can be used to load files upto 27.75K long.

- An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

- RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command, much as you would on a mainframe!

- OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT will create before you waste time compacting and possibly losing your program.

- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to &1100.

- The DFS is fully compatible with TELETEXT, TORCH and both ACORN Second Processor systems. Discs prepared with the Watford DFS can be used under ACORN DFS without any changes, so there are no problems in exchanging software with ACORN DFS users.

- A comprehensive and clearly written manual is available seperately and this explains both the standard ACORN functions and the extra WATFORD features.

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

● 1431 – Medium resolution as used on the BBC television computer programme	**£165**
● 1451 – High resolution, suitable for word processing in mode 0	**£250**
● 1441 – High res. exceeds the capabilities of the BBC micro	**£385**
● 1431AP RGB + PAL and AUDIO	**£199**
● 1451AP RGB + PAL and AUDIO	**£305**
● Dust Cover for Microvitecs	**£5.50**

All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

KAGA

- KAGA Vision 3 Super High resolution, Colour **£310**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics ...... ONLY **£68**

LEADS

BNC Lead for Zenith or Philips	**£3**
RGB lead for KAGA	**£5**

N.B. Carriage on Monitors **£7** (securicor)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Teac drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE

Only £1,119

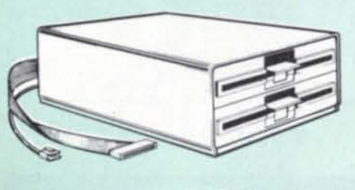
Access

ACCESS HOT LINE (0923 50234)

24 Hours

DISC DRIVES 'JANUARY SALE'

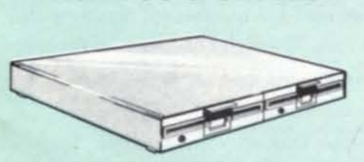
(NEW SLIM-LINE DRIVES)



(DRIVES Cased with Cables. No PSU. Connects directly to the BBC's power socket.)

- **CLS 100** Single, TEC Single sided 40 track 100K, 5¼" Disc Drive **£89**
- **CLS200** Single EPSON Drive, Double sided 40 track, 200K, 5¼" **£99**
- **CLS400** Single, Mitsubishi/Epson Double sided 80 track 400K, 5¼" Disc Drive **£126**
- **CLS400S** Single, Mitsubishi/Epson Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive **£145**
- **CLD200** TEC Single sided 40 track 200K twin 5¼" Drives **£165**
- **CLD400** Epson, Double sided 40 track 400K, 5¼" TWIN Drives **£199**
- **CLD800** Mitsubishi/Epson Double sided 80 track 800K, 5¼" TWIN Drives **£235**
- **CLD800S** Mitsubishi/Epson Double sided 40/80 track switchable, 800K, Drives **£299**

(CUMANA) DRIVES CASED WITH PSU & CABLES



- **CS100** TEC Single sided 40 track 100K 5¼" Single Disc Drive **£119**
- **CS200** Epson Double sided 40 track 200K 5¼" Single Disc Drive **£149**
- **CS400** Mitsubishi/Epson Double sided 80 track 400K 5¼" Single Drive **£165**
- **CS400S** Mitsubishi/Epson Double sided 80 track 400K 5¼" Single Drive **£179**
- **CD200** TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£236**
- **CD400** EPSON Double sided 40 track 400K 5¼" TWIN Disc Drives **£280**
- **CD800** Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives **£339**
- **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£350**
- SPARE DRIVE CABLES, SINGLE **£6;** DUAL **£8**
- DFS Manual (comprehensive) **£7** (No VAT)

(Carriage on Disc Drives £7 securicor)

P.S.

- You do not require a formatting Disc nor the expensive 40/80 track switchable Drives when using Watford's sophisticated Disc Filing System which has this facility as one of the many facilities incorporated in it as standard.

Cont.

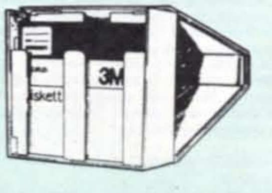
- MITSUBISHI & EPSON Slimline 400K Disc Drives that we supply are Double sided Double Density, 1 Megabyte unformatted, (With BBC Micro 400K after formatting). When used in conjunction with our Double Density Interface, you obtain 725K formatted. Track density is 96 TPI, track to track access time is 3mSec. These drives are very fast, quiet and efficient. We strongly recommend them.
- Extensive test carried out in our workshop has proved that the BBC Micro's own switchmode power supply is capable of driving 2 disc drives and a host of Sideways ROMs without undue heating. We recommend our CLS & CLD range of Disc Drives which will save you considerable expense without sacrificing performance.
- Please send an SAE, for further technical specification on our Disc Drives.

MYSTERIES OF DISC DRIVES

Do you find cassettes slow and unreliable, but hesitate when considering discs because you don't understand the terminology? If so, then this is the ideal book for you.

£5.95 (No VAT)

PLASTIC LIBRARY CASES



for Disc Storage 5¼" (holds 10) **£1.80**

DUST COVERS

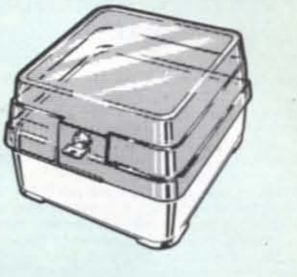
(For our Disc Drives)

Single (without PSU)	**£3.20**
Twin (without PSU)	**£3.85**
Single (with PSU)	**£3.25**
Twin (with PSU)	**£3.90**
Twin (side by side with PSU)	**£3.95**

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store up to 20 discs. Each disc can easily be seen through the clear view pockets.
.... **£4.25**

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 holds upto 40 discs	**£13**
M85 holds upto 95 discs	**£17**

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.
.... Only **£12**

EPSON DUMP ROM

This screen dump ROM is specifically designed for use with the Epson RX/FX printers and the Kaga KP810. It is extremely simple to use as there is only one command to remember. It will accurately dump any screen mode using multiple tones as required. Mode 7 is fully supported giving teletext graphics, double height etc. For those who like to keep life simple this EPROM is only .... **£20.**

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set.

Standard 'pica size'
Proportional spacing
Enlarged
Underlined
Normal type

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

Only: £20

Continued →

NEW

THE EPSON FX/KAGA PRINTER COMMANDS REVEALED

for the BBC Microcomputer
(The only Printer Book for the Epson FX-80 compatible printers).

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

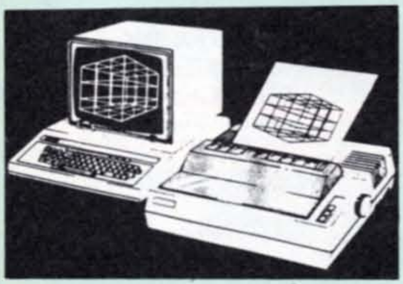
This book is superb value at only
£5.95 (Book – No VAT)

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£32**

TINY PASCAL for BBC Micro £54

DUMPOUT 3
NOW WITH EXTRA FEATURES!



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!

The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.

Two commands are used to operate the dump routines:

*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are many optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs, scale works the same in all modes inc. mode 7.
- R <0-3> – Print dump rotated by 0, 90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min><max>, Y <min><max> – Selects screen area, by default the whole graphics window is dumped.
- P – Dump shows physical colour values.
- G – Grey scale reproduction, dumps otherwise use a negative scale (white prints darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out clearly from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.
- K – Key-triggered dump. The dump does not commence immediately, but can be triggered off later by pressing <SHIFT><0> or <CTRL><ESCAPE>.
- S – Switch-triggered dump. As K, but the trigger is an external switch (not supplied) connected to the user port. The S option can still work with games that corrupt RAM page D.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. Note that GIMAGE and GWINDOW work fully in mode 7.

Designed for use with the following printers:
CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.

Price including comprehensive manual
£22

COLORDUMP ROM

To accompany the marvellous SCP-800 Colour Printer Plotter, Watford are proud to announce a specially written ROM for this UNIT called the COLORDUMP ROM.

This superb new ROM has all the standard DUMPOUT 3 features, including window setting and the new dump-trigger options etc, PLUS plot mimicking. The graphics dump command is now *CIMAGE (so you can have DUMPOUT and COLORDUMP in use together). Dumps having up to 8 colours are possible, alternate-line colour mixing being used to produce approximate magenta, cyan and yellow. *PLOTON All graphics plotting done on the screen using the PLOT and DRAW commands is automatically duplicated on the plotter. Point, line, dotted-line, fine-fill, line-blanking, and triangle fill are all mimicked. With optional parameters:

- H<scale>, V<scale> – Giving fine control of plot scaling.
- I<indent> – To set gap from edge of paper.

*PLOTOFF Turns off plot-mimicking. Selecting shift-lock on is an alternative method of temporarily stopping mimic.

For use with: Seikosha/Sakata SCP800 8 inch plotters and MCP40/CGP115/ Oric 4 inch plotters.

PRICE: Only £22

FX80 PRINTER DRIVER
Watford's own Sophisticated VIEW Printer Driver for FX80

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£6**

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £7

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED
(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 and converted typewriters EX43/44 & 55.

Only: £7

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

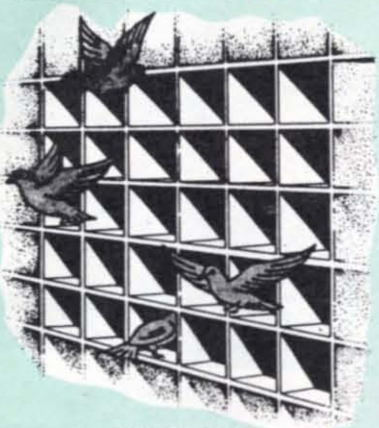
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.

Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features . . . String searching, Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer.

File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.

The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>>=, >=, <, &,.

Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.

Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£99**

PEN PAL–VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
- Free hand drawing
- All Colours
- Fill, Refill and stripes
- User defined "Brush strokes" plus character definer
- Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
- Move design/character to any screen position
- Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.

Works with Watford, RH, Acorn User, DIY and many other Light Pens.

Prices

TAPE .... **£11;** DISC **£12**

LIGHT PEN

This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see eleswhere in this ad).

Only **£20**

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your cassette programs to disc. If you have difficulties transferring your cassette software to your disc system then this is the answer. It handles 'locked' files and full length adventures (up to & &e blocks) and programs that load below &E00. It is very simple to operate with instructions supplied. It saves you time and money.

.... Price **£10**

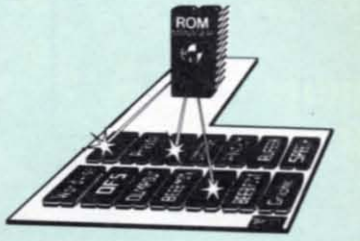
(Please specify 40 or 80 track discs)

ADE

'Systems' complete program development package in a 16K ROM. Full assembling and debugging facilities provided.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.

This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

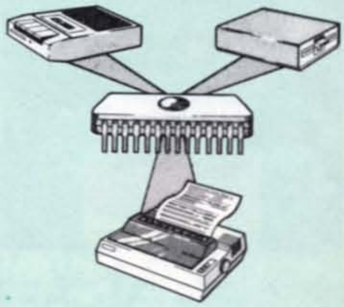
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

BUFFER & BACKUP ROM



For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

★ 4K or 16K buffer for parallel printer.
★ Dumps selection of Disc files to Tape.
★ Makes backup copies of tapes on to tape and disc.
★ Displays contents of paged ROMs on screen.
★ Menu display of ROM filing system contents on Shift-Break.
★ Comprehensive manual.

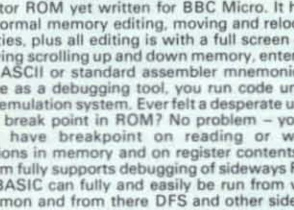
Only £22

Continued →

Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.
In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.
Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£22

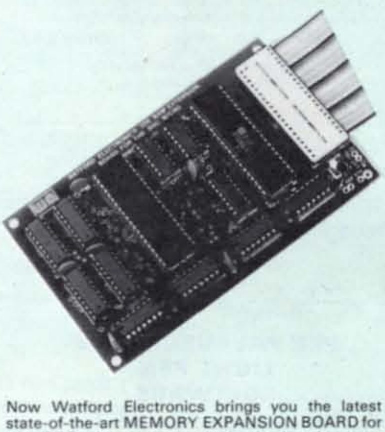


Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.
A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.
Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY **£18**

32K RAM

EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It simply plugs into your micro's 6502 processor socket. (No soldering required). This compact board which fits inside the computer doesn't just give you 16k or even 30k of extra RAM, but a massive **32K !!!**
There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE, etc.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER BUFFER for SERIAL or PARALLEL printers, sound channels, RS423, Keyboard or Speech Synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. e.g. *FX15,21,138, 145, ADVAL (–no.) etc.

- This board is the ideal complement to any word processing system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +)

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion board, double density DFS Units and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can be either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

JANUARY SALE

Only: £60 (carr. £1)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

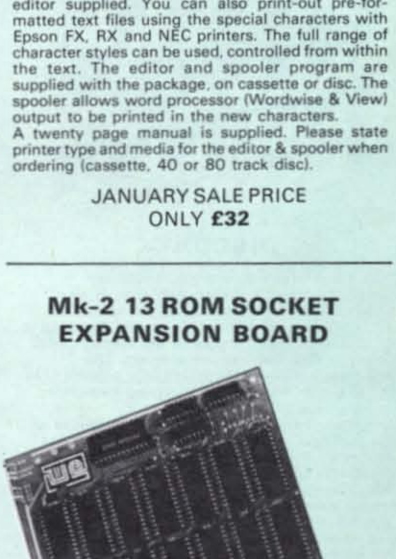
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

JANUARY SALE PRICE
ONLY **£32**

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).
Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

SPECIAL OFFER: £28 (carr. £1)

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
TERMI	£27
COMMUNICATOR	£58

Wordwise

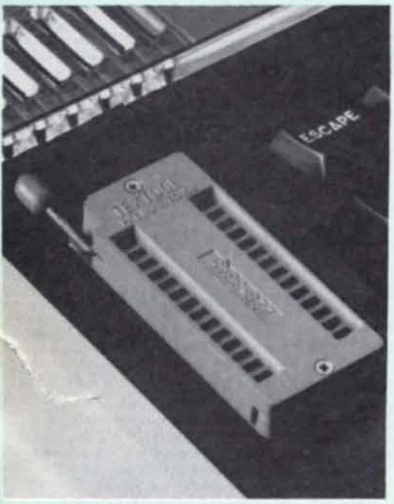
Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

WORDWISE PLUS

Now available from stock **£49**

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£16** (£1 carr.)

The UNICOM Modem

Are you thinking of purchasing a low cost high performance modem, but finding yourself confused by the features offered and the different prices? Well now the answer is here, in the form of The UNICOM Modem!

This fabulous modem offers the packed with all the features most Users will ever want (plus many more!) The software includes some of the most powerful, flexible and easy to use modem software ever written for a micro.

Price:

UNICOM MODEM	£49.95
UNICOM ROM Software	£20.00
UNICOM disc Software	£10.00

(Carriage £2.50)

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

MODEM 84

PRESTEL TERMINAL

For the BBC Microcomputer

COMMUNICATION
WATFORD ELECTRONICS OFFER YOU THE KEY TO WORLD COMMUNICATION

The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM. Please write-in for full technical literature.

PRICES

MODEM 84 (with Lead & Manual)	£68
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and manuals	£82
PRESTEL SOFTWARE ROM +Manual	£20
USER to USER 1200 BAUD SOFTWARE ROM	£18

(At these incredibly low prices for such a sophisticated BT Approved Prestel Terminal, Modem 84 has to be the best buy around)

(Carriage on Modem *£2*)

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes comprehensive manuals) **£119**

STAR LAUNCH

ELECTRONIC DESK DIARY for the BBC Micro

Watford's Electronic Desk Diary and Clock is a complete Diary, Alarm Clock and a Calendar. The attractively finished desk top unit comes complete with power supply, its own on-board RAM and software in an 8K ROM.

Features include:

- A complete desk diary, planner, calendar and full feature alarm clock for the BBC microcomputer.
- Software supplied on ROM for instant access.
- Over 100 events programmable into the minimum RAM.
- Events may be assigned many levels of priority.
- Diary may be opened at any date.
- Events may cause programmes to be executed at any predetermined time and date.
- Events may repeat yearly, monthly, weekly or daily.
- BBC will be powered up automatically to execute important events.
- 2K of CMOS RAM provided as standard for storing events.
- RAM expandable to 32K.
- No BBC's workspace RAM required.
- Printout of calendar for any month and year specified (between the years 1900 and 2100).
- Printout of current time and date on request.
- Easy access of time and date from Basic and other programmes, (including M/C programmes).
- Internal power supply (no power taken from BBC).
- Interfaces to 1MHz bus.
- Battery backup optional.
- Diary compatible with all 'legal' BBC add ons and ROMs.

Watford's Desk Diary Unit is a must for every serious user of BBC Micro.

Introductory Price: Only **£75**

(Carriage £2.50)

Versatile BEEB SPEECH SYNTHESISER Unit

Watford Electronics
Beeb Speech Synthesiser

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
36 Challenging Games for BBC	£5.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10.00
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
A beginners guide to LISP	£10.95
Advanced Machine Code Technique for BBC	£7.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC	£7.40
BBC BASIC	£5.95
BBC Computer Magic	£5.50
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
CP/M The software BUS	£8.95
CP/M Users Guide	£13.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£7.50
Introducing the BBC Micro	£5.95
Introduction to FORTH	£9.30
Interfacing projects for the BBC Micro	£6.95
Introducing LOGO	£5.95
Let your BBC teach u to program	£6.45
LISP	£9.25
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£13.65
Programming the 6502	£11.95
Programming the Z80	£14.25
PASCAL	£9.25
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Using 6502 Ass. Language	£14.50
Wordstar & CP/M made easy	£6.95

Watford brings you

THE AMX MOUSE

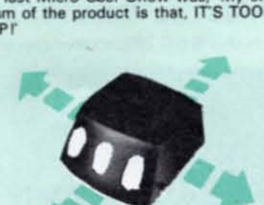
'The program is simplicity itself and the user manual is virtually redundant' . . . Micro User Jan. 85.

Bring into your home or office the last word in user friendly input devices for the Beeb. The AMX MOUSE that won the hearts and the minds of thousands of visitors at the Show has arrived at Watford Electronics at a very special price!

Using simple Icons, and small movements of the mouse on a work surface, you can select any one of the functions from the pull down menus. The mouse will operate from within Wordwise, View and many other software packages. The three buttons built in to the mouse are user programmable for many extra functions.

The package consists of the mouse, the advanced controlling software in ROM and a disc containing the Icon designer and the AMS ART software (see diagrams).

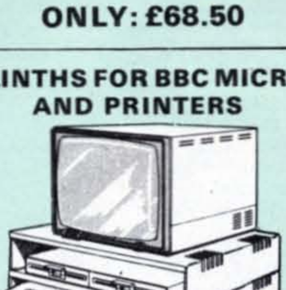
To summarise this superb product a comment passed by a very senior authority on BBC micro at the last Micro User Show was, 'My only criticism of the product is that, IT'S TOO CHEAP!'



OUR SPECIAL INTRODUCTORY OFFER PRICE

ONLY: £68.50

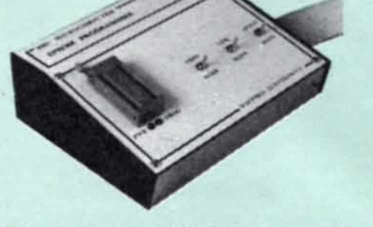
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH .... **£11** (carr. £1.50)
DOUBLE BBC PLINTH .... **£20** (carr. £2.00)
PRINTER PLINTH .... **£10** (carr. £1.50)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset.
Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**
Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick **£12.55**
Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

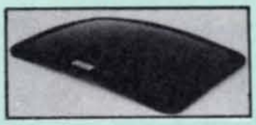
Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug, long leads provided.

Single Player version **£9.75**
Two Players version **£15.00**

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills – Use a Watford Electronics anti-glare filter!

● Made in Britain by a long established glass maker.

Available in 9", 12" and 14" versions – please specify when ordering.

Special Price: **£15.00** (carr. £1)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£8.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

ONLY: £4.95

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2 carr.)

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.
£20

DATA CABLE to connect recorder to BBC
£2.50

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

ASSORTED CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug

to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

MONITOR LEADS

Microvitec RGB leads 6 pin DIN to 6 pin DIN for colour monitors.	**£2.50**
KAGA/SANYO Colour Monitor Leads	**£5.00**
Monochrome monitor leads BMC to Phono	**£3.00**

DISC DRIVE POWER LEADS

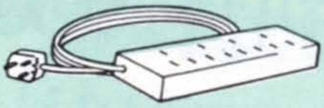
Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of all your valuable Disc Software. Makes full use of all 8271 facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

PRICE **£25**

CHIP EXTRACTION TOOL

This extremely useful tool allows trouble-free IC removal from your computer. No longer do you have to weald a screwdriver at your valuable ROM software, instead this IC extractor distributes the removal force over the whole body of any 24 or 28 pin device, thus preventing undue damage to your chips.

Isn't £1.50 a small price to pay to protect your ROMs stature? Price: Only **£1.50**

ADVENTURE GAMES (level 9)

COLOSSAL ADVENTURE	**£8.50**
ADVENTURE QUEST	**£8.50**
DUNGEON ADVENTURE	**£8.50**
SNOWBALL ADVENTURE	**£8.50**
LORDS OF TIME	**£8.50**

Please add £2.50 for Discs

MISCELLANEOUS

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL PLUG

SOLDER type	**£2.90**
IDC CRIMP type	**£3**

RIBBON CABLE

28way **55p/ft**; 34way **60p/ft.**

8way DIP SWITCH **£0.85**

CHIP SHOP CORNER

7438	**75p;**	74LS00	**30p**
74LS04	**35p;**	74LS10	**30p**
74LS123	**120p;**	74LS163	**85p**
74LS244	**£1;**	74LS245	**£2**
74LS393	**120p;**	4013	**60p**

4020	**£0.90**
4816	**£3.00**
UPD7002	**£7.25**
6502A CPU	**£5.45**
65C02 CPU	**£9.50**
6522	**£3.40**
6845S	**£7.50**
LM324	**£0.75**
SAA5050	**£8.75**
SN76489	**£5.50**
2764-250n	**£4.50**
27128-250	**£13.00**
6116LP-2K	**£3.50**
6264LP-8K	**£15.00**

RECENT RELEASE

BBC MICRO VIDEO DIGITISER

Using any video generator with a composite video output (e.g. a standard video camera or video recorder), the Beeb Video Digitiser will convert any image into a graphics screen of the BBC micro in modes 0, 1 or 2. The video source may be a camera or video recorder.

Once an image has been captured, it can be compressed and stored to disc, printed on an Epson or similar compatible printer, analysed for scientific and educational use, directly used to generate graphics or converted to other formats, e.g. slow scan television.

The output of the digitiser exactly matches the graphics capability in each mode, with up to 8 grey levels in mode 2. The unit connects into the user port, automatically scanning a complete picture in 1.6 seconds. The software to control the digitiser is supplied in EPROM and can be easily accessed using star commands directly from BASIC.

The package is designed to allow easy input of complex screens and then give full access of the data to the user. The special printer dump routine included in the driving software is especially designed to produce a fast and correctly proportioned picture with reduced contouring. Detailed examples of how to drive this unit from BASIC or other languages are provided in the manual.

SOUND EFFECT (ENVELOPE) ROM

BEEP
POW
ZAP
WOW
FIRE
BLIP

Now for the sound fanatic or those of you who want to drive the pet crazy, Watford Electronics offers you this unique piece of firmware called the Envelope ROM. It contains a wide range of sound effects, in fact enough to ZAP, BANG, SQUEAK and EXPLODE your way through a whole galaxy of games. Some of the more unusual effects include ZIT, TRIMPHONE, SNAPPER, TARDIS, and a whole host of explosions, gun fire, winning and losing sounds and many other effects to aid the progress of a game. A choice of over 65 sounds.

The sounds are accessed via single star commands, the pitch and duration of any of the sounds can be altered from their default value at any time by adding extra parameters.

A must for all the games designers. Supplied complete with instructions.

ONLY £18

Prices subject to change without notice and available on request.

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME. GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
CARRIAGE: Unless stated otherwise, please add £1 to all cash orders.

VAT: UK customers please add 15% VAT to the total cost incl. Carriage.

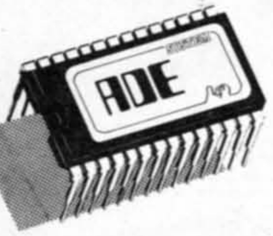
SHOP HOURS: 9.00am to 6.00pm. Monday to Saturday. (Ample Free Car Parking Spaces)
ACCESS ORDERS: Simply phone: Watford (0923) 50234. (24 Hours)

Watford Electronics

Dept. AU, 250 High Street, WATFORD, ENGLAND
Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC

SYSTEM SOFTWARE

·ROMs FOR THE BBC MICROCOMPUTER·



Now second processor compatible - over twice as fast across the Tube© and enhancements.

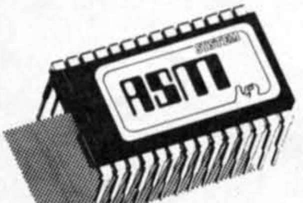
The complete program development package for assembly language programmers. ADE is the de facto industry standard for professional software writers using the BBC microcomputer. The 16k ROM contains a full 6502 MACRO assembler; a dynamic text editor; a front panel debugging monitor and disassembler. ADE comes complete with a 160 page comprehensive reference manual and a utility/macro library disc. ADE can also be used with tape based machines.

The ASSEMBLER features macros with library facilities; nestable conditional assembly; flexible listing options (with or without macro expansion); hex, decimal, binary and ASCII data formats; dummy section; full range of arithmetic and logical operators; symbol table sort and dump; file chaining and 29 powerful pseudo ops. Source and object files are kept on disc so there is no limit on program size or location.

The EDITOR is designed with the programmer in mind for writing both programs and documentation. The editor includes a very powerful command language (including macros) that enables much editing to be done on a semi-automatic basis. It features full screen editing and deferred edit modes; no limit to document size; edit with backup facilities and a versatile text formatter.

The DEBUGGER is instantly accessible for inspecting, modifying and disassembling machine code programs. Features include full 64 byte display in hex, ASCII and disassembled format; registers; stack; single step; breakpoints; memory search and much more.

Price £60 inc vat. Please specify 40 or 80T utility disc.



ASM provides all the superb features of the ADE macro assembler on its own ROM.

The program source file may be written using any editor (even Wordwise or View!). Complete with reference manual and utility/macro library disc. Use the assembler that professional software writers use.

Price £35 inc vat. Please specify 40 or 80T utility disc.

Now second processor compatible.

SPY2 is a combined front panel debugging monitor and disassembler with extensive disc utilities all on one ROM. SPY2 is instantly accessible to the programmer for inspecting, modifying, debugging and disassembling machine code programs. SPY2 also features a relocator and program trace facilities. SPY2 will access any ROM either in the sideways ROM sockets or on an extension board. ROM memory may be displayed, single-stepped through or disassembled.

SPY2 includes a set of powerful disc recovery commands for interrogating, editing and retrieving data stored on a floppy disc. SPY2 also includes a disc formatter as well as a non-destructive single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

The SPY2 front panel encompasses all the superb, easy-to-use facilities of the renowned SPY debugging monitor PLUS additional commands for toggling and finding breakpoints; relocating machine code programs; single stepping through subroutines in one go and facilities for accessing the front panel from programs in RAM or ROM with breakpoints, OSBYTE or CTR-F.

SPY2 features a versatile disassembler with hex dump, full and intelligent disassembly. This identifies data areas in the program; these being displayed as a hex/ASCII dump. Operating system calls are labelled creating very readable code. The powerful trace facilities enable program instructions and register contents to be traced to printer whilst the program is running. Indispensable for graphics programs as they can be stepped through whilst observing the effects on the screen.

SPY2 features a disc sector editor displaying the contents of a whole sector; disc search facilities for finding byte patterns or strings and free disc space. Files may be recovered by creating a directory entry with all the data concerning the deleted file. Directory entries can be easily amended using the *AMEND command. The *FORMAT command formats discs with any number of tracks. A verify command checks discs. The *REFORMAT command is extremely useful for recovering information from a bad track, reformatting it and restoring the data. Commands are included for loading files at &1900 and automatically downloading (and running) them.

The most comprehensive of all debugging/disc utility ROMs.

Price £30 inc vat.

(0742) 682321

Dealer Enquiries Welcome

SYSTEM

Dept. AB 12 Collegiate Crescent, Sheffield S10 2BA

FEBRUARY '85

TECHNOMATIC

BBC Computer & Econet Referral Centre

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

ACORN COMPUTER SYSTEMS

BBC Model B Special Offer	£320 (a)
BBC Model B + Starter Pack	£348 (a)
BBC Model B + DFS	£409 (a)
BBC Model B + Econet	£389 (a)
BBC Model B + Econet + DFS	£450 (a)
BBC Dust Cover	£4 (d)
Pair of Joysticks	£14.50 (d)

UPGRADE KITS

A to B	£65 (d)	Installation	£20
ACORN DFS Kit	£95 (d)	Installation	£15
Econet Kit	£55 (d)	Installation	£25
Speech Kit	£47 (d)	Installation	£15
BASIC II Rom with user guide	£22.50		
1.2 O/S Rom	£7.50	DNFS Rom	£17.50
4816AP Memory upgrade RAM	£2.00		

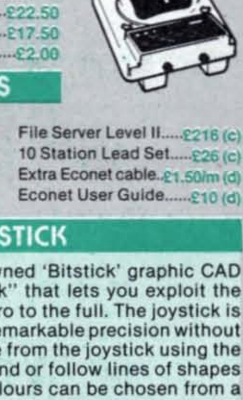
ECONET ACCESSORIES

Terminator (Two reqd per installation)	£31 (c)
Clock with psu	£39 (c)
Printer Server Rom	£41 (c)
File Server Level I	£86 (c)
File Server Level II	£216 (c)
10 Station Lead Set	£26 (c)
Extra Econet cable	£1.50/m (d)
Econet User Guide	£10 (d)

ACORN BITSTICK

The Acorn adaptation of the renowned 'Bitstick' graphic CAD package — the "expensive joystick" that lets you exploit the powerful capability of the BBC micro to the full. The joystick is of a robust design which achieves remarkable precision without fiddliness. Total control is available from the joystick using the on-screen menu. It can draw freehand or follow lines of shapes chosen with high accuracy, and colours can be chosen from a palette displayed on the screen. Any part of the drawing can be magnified, by a virtually unlimited number of times, and upto 48 drawings can be saved on a single disc. The discs use a visual library system for easy identification. Inspite of its powerful features, the Bitstick is extremely friendly and easy to use, due to menus being displayed on the edge of the screens. £325 (a)
FX80 dump routine for the bitstick available.

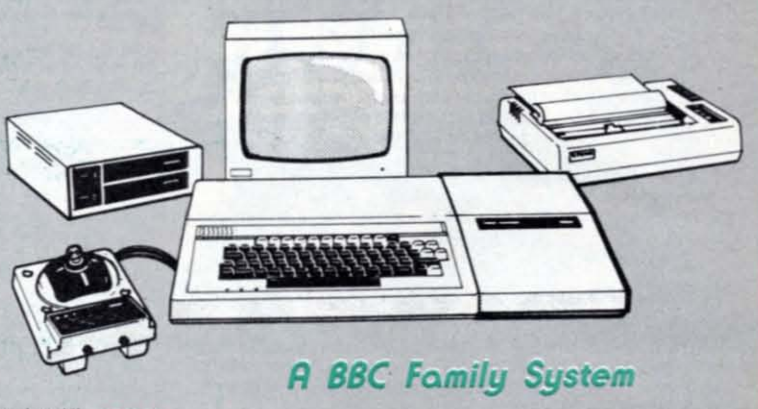
TORCH UNICORN PRODUCTS



The TORCH Unicorn system has been in the field for over two years and is now a proven Z80 system for the BBC. It gives you the potential to expand which no other system can currently offer. You can expand a single system with a 20Mb Hard Disc, have the processing power of a 32bit 68000 cpu with 256K ram and a UNIX operating system, or set up a network of upto 254 machines. All these capabilities are available NOW.

TORCH UNICOMM

For the Torch Z80 card user, comes a superb communications package. A BT approved modem using 1200/75 and 1200/1200 baud is supplied complete with BBC RS232 cable. Three superb software packages in CP/M included, clearly demonstrate TORCH's experience on the communications scene: UNIVIEW for PRESTEL type use, allowing saving of frames, downloading of files etc. UNITERM is a sophisticated terminal emulator. UNIMAIL is an amazing package specifically for TORCH users. Among other facilities, it allows messages and files to be accessed from distant machines — access to files can be controlled by hierarchial passwords. Hardware + software: £159(a)



A BBC Family System

ACORN Z80 2nd Processor

This processor converts your BBC into a complete business micro with all the computing power a professional would need. The system is CP/M based and is supplied with a very extensive software package. The package includes three office productivity programs, (memoplan, fileplan and graphplan), Systems generator program, three programming languages plus the ACCOUNTANT business program. Software is accompanied by extensive manuals that not only get you started but also answers your whys and hows.

All for only £398 (a) (incl VAT)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his computer. This processor provides increased memory — allowing up to 44K for Basic programs and up to 60K for assembly language programs, regardless of screen mode in use. (ideal for VIEW). An increase in speed means that programs run up to 50% faster. The second processor/BBC combination offer computing power comparable to systems costing twice as much. £175 (a)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. (will run Lotus 123!). With 256K RAM and single/dual drives, it simply connects through the 1Mhz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the superb Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.
G800/2: £945(a) Full Spec. & prices on application.

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	£275 (a)
Z80 Disc Pack ZDP240 with software as above	£675 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive	£1,950 (a)
UNICOMM Communications Package + modem	£159 (a)
Unicorn 68000, Unix OS/Z80B/256K, 20MB Hard Disc, 400K Floppy	£2995 (a)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- Epson Compatible Control codes
- 80 or 156 Column
- NEAR LETTER QUALITY Print using 23 x 18 matrix
- Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- Dot Addressable graphics in various modes
- 3K buffer which can also hold user defined characters
- Extra socket for eprom with custom made font
- Friction & Tractor feed with built in paper roll holder

KP810 (80 column) **£255 (a)**
KP910 (156 column) **£359 (a)**

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T **£215 (a)** RX80FT **£225 (a)**
RX100 **£345 (a)** FX80 **£315 (a)** FX100 **£435 (a)**

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Porportion spacing • Underline • Bold & Shadow printing • super/Sub script + many other features.

BROTHER HR15 **£340 (a)**

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 **£340 (a)**

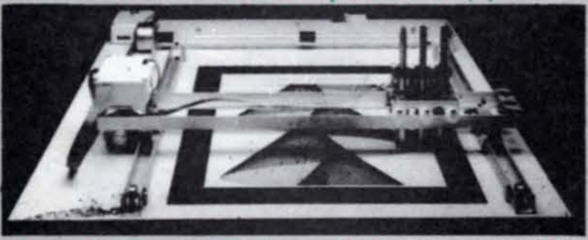
ACORN VIEW PRINTER DRIVER GENERATOR

This printer driver generator will end your search for the printer driver that suits your printer. You can fully exploit all the features of your printer by generating a driver to suit your particular printer. All you need to do is to answer a series of simple questions relating to your printer and you will have your driver. You can generate as many types of printer drivers as you require. Screen driver supplied with the printer driver enables highlighted text to be displayed on the screen showing the effects of underlining, bold, superscripts, subscripts, italics etc. MPRINT program enables more than one file to be printed at a time including the current text. Comprehensive manual supplied with the disc. £10(d)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete **£490(a)**



Basic Plotter **£270(a)** Opto Sensor **£72(c)**
Drill/Router Attachment **£79(c)**
Power Supply: PS12V **£42(c)** PS24V **£78(c)**

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
32K Internal Buffer Parallel £75(b)
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);
8132 Apple II £60(c); 8165 IEEE + Cable £65(c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);
FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £85(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £199(a); Tractor Feed Attach £99(a)

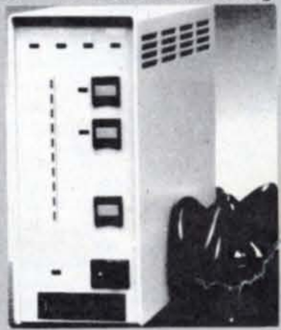
BROTHER HR15: Sheet Feeder £199(a); **Ribbons Carbon or Nylon** £4.50(a)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" x 11" £13(b) 2000 sheets 14.5" x 11" £18.50(b)
Labels: 2-3/4" x 1-7/16" in quantities of 1000
Single Row: £5.25/1000 (d); Triple Row: £5.00/1000 (d)

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. it can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. In networked systems it can eliminate the printer server unit. The 64K buffer would hold over 30 A4 pages of text.



Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£245(a)**
Cable Set **£30**

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No power required.

Three Computers to one centronics printer (all 36 lines switched) £65(b)
Four Computers to one centronics printer (all 36 lines switched) £79(b)
Three Computers to one serial printer/modem (all 25 lines switched) £59(b)
Four Computers to one serial printer/modem £69(b)
BBC Cable Sets 3 way £22(c) 4 way £27.50(c)

Computer Sharer:
Allows one computer to be connected to two parallel printers fitted with cable for the BBC computer £19.50(b).

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. £110(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50 (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC

14" RGB

1431 Std Res £165(a); 1451 Med Res £240(a)
1441 Hi Res £399(a)

14" RGB with PAL & Audio

These monitors can receive TV programs thru a Video Recorder

1431AP Std Res £210(a); 1451AP Med Res £280(a)

All 14" monitors now available in plastic or metal cases, please specify your requirement.

20" RGB with PAL & Audio

2030CS Std Res £380(a); 2040CS Hi Res £685(a)

20" RGB

2031 Std Res £260(a); 2040CS Hi Res £570(a)

KAGA TAXAN 12" RGB

VISION II Hi Res £240(a)
VISION III Super Hi Res £340(a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
ZENITH 123 Hi Res 12" Green Screen	£68(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

BBC Leads Kaga RGB **£5(d)** Microvitec **£3.50(d)** Monochrome £3.50(d)

RB2 TRACKER BALL

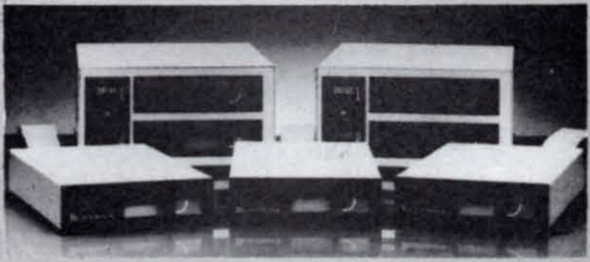
Marconi
RB2

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation to incorporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional control of robots, drillheads etc. RB2 which plugs into the user port is supplied with utlity programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

AMX MOUSE – As seen on the BBC TV Micro progam

Allows advanced features such as Icons. Windows etc, replaces cursor keys in ordinary programs, as well as sophisticated CAD design. Comes with the 'AMX Art' CAD Package, as well as a Rom, allowing easy creation of icons, as well as use with Wordwise and View. A screendump for design drawings is included. The Mouse comes complete with CAD Package, ROM and full instruction manual. £75(c)

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. Single drives are offered with or without integral power supply whilst the dual drives are supplied with generously rated switch mode power supply. Attractively designed steel casings are painted in hard wearing BBC matching paint. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives

1 × 100K 40T SS : TS55A £100(b); CS55A with psu £125(b)
1 × 200K 40/80TSS : TS55E £140(b); CS55E with psu £150(b)
1 × 400K 40/80TDS : TS55F £145(a); CS55F with psu £169(b)

Dual Drives

2 × 100K 40T SS: TD55A with psu £250(a)
2 × 200K 40/80T SS: TD55E with psu £325(a)
2 × 400K 40/80T DS: TD55M with psu £350(a).
2 × 400K 40/80T DS: TD55MP in flat pack with built-in plinth £350(a).

DISC DRIVE MULTIPLEXER

NEW

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard. Mains powered.
Write for full details.
TDM 4 Quad Unit (upto 4 computers) £135(a)
TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M
DISKS
£1 Voucher for every 10 discs purchased until voucher stocks last

Industry standard high quality discs with guaranteed error free performance for life. £1 Wine Voucher with purchases of every 20 discs only until voucher stocks last.

Discs in packs of 10:

40T SSDD **£15(c)** 40 T DSDD **£18(c)**
80 T SSDD **£22(c)** 80 T DSDD **£24(c)**

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 30/40 Discs £14(c) 100 Discs £19(c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.
Floppiclene with 20 disposable cleaning discs. £14.50(b).

COMMUNICATIONS

We offer the customer a choice of BT approved modems and suitable communication software, enabling the user to choose an ideal cost-effective system, perfectly suited to his individual needs. We stock modems for every requirement, whether it is for the business, or private user, whether you require access to a public database, bulletin boards or a mainframe, whether for local or international use.

MODEMS

TORCH UNICOMM See our section on Torch for further details.

ACORN PRESTEL The dedicated Prestel adaptor complete with integral, BT approved, auto-dial modem and software in ROM £120(b)

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered £55(c) BBC Lead £6 External PSU £9(c)

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21,V23,BELL 103/113/108 and including 75,300,600,1200 Baud ratings. (It even includes 'reverse Prestel'!). This is the modem that will cover 'Prestel' type systems as well as Bulletin Boards both in the UK and abroad. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto-dial/auto-answer makes this modem unique. WS2000 £129(c) BBC Serial Cable £7

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30(d).** BBC User Port cable (for modem control) £7. **SKI KIT** (Allowing total control of the modem by your computer) **£10. DS1 Disc (for Commstar):** When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling £10.

UNICOM A High Performance, yet low-cost Modem. Features include: Auto-dial & auto-answer, Auto baud rate scan, 75,300,1200 Baud rates with V21, V23 and Bell standards. Sophisticated software in ROM allow many features like: Auto-Dial. Redial, Remote facilities etc. An Auto-Dial disc allows storage of commonly dialled numbers. UNICOM £49.95(b) Unicom ROM £20 Unicom Disc £9.95 Unicom Cable £6(d) Not BT approved

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 62(b) BBC Lead £7.00

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. £29(d)

TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). £28(d)

COMMUNICATOR **This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL).** £59(d).

TECHNOMATIC

All prices exclude VAT

EPROMER II

This enhanced eprom programmer will handle the full range of popular single rail eproms. Its sophisticated menu driven software makes the programming of eproms simple and efficient. Features included in this programmer are normally found in industrial grade programmers costing many times more.

- Interfaces with the BBC through 1 Mhz bus. Fully buffered and complies with the ACORN protocols. Integral power supply ensures no power drain from the computer.
- All eproms up to 16K programmable in single pass.
- User friendly software driven menu provides total control from the keyboard — no knobs to fiddle with.
- Selectable programming voltage — 25/21/12.5V.
- Defaults to normal programming — high speed algorithmic programming selectable.
- READ/BLANK CHECK/PROGRAM/VERIFY at any address or addresses.
- Constant display of all options selected.
- Full screen editor with HEX/ASCII input — Full TAPE/DISC filing facility.
- Data entry from the keyboard, disc/tape or another eprom.
- Several BBC BASIC programs can be entered on one eprom.

EPROMER II with manual & cassette £99(b) Software on: Disc £3 Rom £10

UV ERASERS

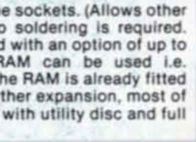
UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).
UV1 as above but without the timer. £47(b).
For Industrail Users, we offer UV140 & UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 £61; UV141 £79(b).

SMARTMOUTH

The original 'Infinite Speech' Synthesiser — Still the best around!! A ready built, self contained speech synthesiser unit, attractively packaged with built in speaker. Tailored frequency response audio stages for optimum sound quality. Any word can be easily created — very economical with memory. Plugs into the user port — no roms required. Demo and development programs supplied on cassette (easily transferred to disc) £31(c)

'TIME-WARP' REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. £29(c)



RAMROM-15

The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £112(b)

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. £39(d) Back-up Kit £18.

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ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

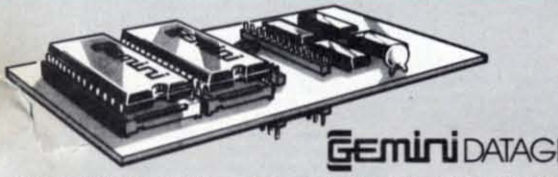
ACORN TELETEXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. £195(b)

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. £174(a)

DATABASE MANAGEMENT SYSTEM



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The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. £112(c).

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £75(d)

ROMs/SOFTWARE

VIEW Acorn's new version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48(c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52(c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13(d)

WORDWISE One of the most popular word processors for general use £34(d). Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price £16.50(d). If bought with Wordwise: No p&p and only £14.

SPELLCHECK II: A rom based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17000 words on 100K drive. Fully compatible with 6502 second processor. £26(d)

ACORN P SYSTEM: A full implementation of the portable P SYSTEM operating system for the BBC Micro with a 6502 2nd Processor. It includes Filer, Editor, Utilities, and Compilers for USCD PASCAL and FORTRAN 77. This PASCAL is the latest version (IV.1) of the UCSD Pascal Project. FORTRAN is a ANSI Fortran 77 subset.
P-System is widely used by Universities and business software authors because of the facilities offered and the ease of program development and the portability of the final product. £261(b)

ISO-PASCAL: Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60(c)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60(b)

ULTRACALC This enhanced version of the original BBC Publications popular spreadsheet rom includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normality found in well designed spreadsheets. £69(d)

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £52(d)

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. £52(b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. £43(d)

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b)

ACORN LISP Rom £43(d)

COMAL Write for details and availability £43(c)

6502 DEVELOPMENT PACKAGE Write for details and availability £43(c)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM £43(d)

DISC DOCTOR Computer Concept's popular disc utility rom which adds 20 commands to the DFS system. £27(d)

DISCMASTER Beebug's a disc utility rom which provides additional DFS commands and utilities including disc menu to automatically RUN/*RUN programs, converting 40 track discs to 80 track and enable dual catalog. £16(d)

EXMON II Updated version of the EXMON rom with facilities including dual screen operation and full screen memory editor. £24(d)

SLEUTH A debugging tool for BASIC programs which includes features like single stepping of dual screen programs, and accelerator to run programs from full speed to freeze frames. £24(d)

GRAPHICS ROM Adds 28 new graphic related commands and features include sprites, turtle graphics, rotation, scaling, 3D plotting all using "★" commands. £27(d)

BASIC COMPILER Write for details and availability.

PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor x2, x3, x4 etc. A special feature allows true MODE 7 screen dumps with TELETEXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the *command. *DEFINE allows the printer to define his own characters and store them. *GPRINT allows printing of enlarged text in any position, orientation, size & shade. *WINDOW allows windows to be defined in any size and position on the screen. Can allow you to do printing as background oepration while the computer does other jobs. **In short this one ROM does it all.** £28(d)

DUMPMASTER Disc based program that produces fast machine code routines for a variety of printers incl. EPSON MX/FX, STAR 910, Seikosha, NEC PC8023, INTEGREX 132A. Dumps in 8 shades in any mode including teletext mode. Snapshot facility allows dumps from games and other programs. £10(d)

MUROM Sound Extension Rom: Helps you create your own tunes and sound sequences either with MUROM's editor and a musical score or using the keyboard to simulate a piano. Edit your creations with the full screen music editor and then switch to envelope editor to tailor the tonal quality and select instrument type. Incorporate the music into other programs or playback with or without MUROM. Instant sound effects can be called from Basic eg *ZAP, *SIREN, *EXPLODE etc. £24(d)

HELP Rom based comprehensive on screen HELP facility to aid and speed up programming. £21(d)

Write for details on specification and availability of the following packages expected to be released shortly:

Basic Compiler   Comal   6502 Development Package

MICROTEXT This authoring system developed by the NPL allows production of a wide range of man-computer dialogues. User can draw up a frame made up of text/graphics and combine a series of frames to create modules which are incorporated into a program. An expert in any field can create complete courses of computer based instruction material. Applications include interviewing systems, teaching packages, training courses and interactive demonstrations and simulations. Disc £53(b) Cassette £43(b)

Replica II 40 & 80 Track Versions available. £10.35(d)

Design Design is a second processor which allows information to be displayed in a format suitable for demonstrations, slide projections, handouts or presentations. Graphs, Pie charts & Bar Charts are quickly produced; automatically drawn & scaled. Versatile labelling facility, 24 User defined, 4 large macro characters plus screen dump facilities included. £16.50(d) Disc (80 or 40 Track).

Superplot Superplot is ideal for screen representations of mathematical functions. It will plot on automatically scaled axes, in Cartesian, Polar or Parametric co-ordinate systems and will allow overlapping of graphs. **Cass** £8.50(d).

Spellcheck I Menu driven spelling checker for Wordwise or VIEW. Dictionary contains 6000 words and is expandable to 1700 on 100K disc. £16.50(d) Disc (80 or 40 Track) Specify whether Wordwise or VIEW.

Masterfile II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. The disc version allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWIDE/VIEW £16.50(d) Disc (80 or 40T).

CP/M SOFTWARE FOR TORCH Z80 ACORN Z80 PROCESSOR

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. The following are generally available from stock.

DBASE II £335(a) **WORDSTAR PROFESSIONAL £380(a)**

WORDSTAR £275(a) **DBASE II Tutorial..... £32(c)**

PROPASCAL £250(a) **CP/M Tutor £55(c)**

Phone for your specific requirements.

Please specify the type of format (TORCH or ACORN) required.

Hershey Character font generator: Disc based menu driven package with 1500 new characters made up from 9 different Hershey character fonts. Flexible utility allows choosing of any characters and appending them to users programs. Screen dump routine for Epson printers included. £12.50(d)

When ordering software on disc plese specify track format (40/80)

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ALL THE THRILLS OF THE STUNT RIDER

HAVE you ever been attracted by the thrill of jumping a powerful motorcycle over a row of London buses, but never fancied the gravel rash at the other end?

You would probably be well advised to take a few practice runs using **Eddie Kidd's Stunt Challenge** from Martech.

The cassette contains versions for both the BBC and Electron. Those of you with monochrome monitors will be pleased to learn that once the program has loaded you are asked whether you want colour.

Replying 'no' selects colours that give better contrast on monochrome sets.

When starting the program you will be required to make your first two jumps on a BMX bike. These completed you graduate to a five geared motorcycle. This is where the fun begins.

The rider kick starts the bike and then waits for you to rev up the engine and put it into gear.

THE OFFICIAL
Eddie Kidd
STUNT CHALLENGE
BBC 'B'/ACORN ELECTRON
martech

With all the grace of a baby giraffe you will then proceed to wheelie the machine and fall flat on your back.

This won't be the last time that you find yourself in this position. Don't over-rev . . .

Before attempting a jump you must assess how far to ride away from the ramp to give yourself a sufficient run up.

Having reached this position you turn the bike around, blip the throttle, kick her into gear, and build up speed. Careful gear changes will keep the front wheel on the ground until you reach the ramp.

It is at this point that you find out whether you judged your run up correctly. Too slow and you fail to reach the far ramp. Too fast and you clear the ramp, land with a thud, and have tears in your eyes.

The player has total control at all times. By blipping the throttle during the approach you can lift the front wheel and get a bigger bonus for clearing the jump.

Even in mid-air the rider has to be moved backwards and forwards on the machine to ensure that it touches down at the correct angle.

If the real thing is half as challenging as this then I will definitely be sticking to my bicycle.

Jon Revis

Meet Jack, the music miner

JET-Boot Jack is an excellent Manic Miner version for the BBC Micro. The aim is to amass the greatest music collection in the world which you do by picking up all the notes lying about on each screen.

The scenario is a set of caverns – what else? – fitted out with a variety of lifts to shuttle you about.

You must also keep your jet-boots topped up with jet-boot propellant by collecting fuel pods that occasionally appear.

There are 10 screens – getting more difficult geographically and opposition-wise. Sliding platforms and conveyor belts provide the tricky landscapes and various hopping nasties, extending Stators and Flappers wreak havoc with poor old Jack.

He can sometimes kill the nasties by jumping up and down above them – but this doesn't always work.

JET-BOOT JACK
BBC MODEL B
ENGLISH SOFTWARE

Graphics in this English Software game are very detailed, even down to Jack's headphones and the frameworks of the various nasties. The sound effects are quite good too.

The keys take a bit of getting used to – I kept trying to activate the lifts instead of ducking under bits of low-hanging rock. Luckily there's a pause control to give you time to mop your brow if things start to hot up.

Six skill levels are allowed, including a gremlin-free practice mode. On higher levels, more nasties will appear, fuel gets scarcer and the scoring goes up.

To sum up, though having to look out for low ceilings, departing lifts and extending gremlins took some getting used to, I quite liked it after a day or two.

It's probably a bit complex for very young children but the average micro user could have quite a bit of fun.

Philip Tudor

Chalksoft
DAS SCHLOSS
Booklet with instructions and hints inside

Castle lacks a German carrot!

DAS Schloss from Chalksoft, is aimed chiefly at schoolchildren. It tests German vocabulary by presenting English words one by one from a set of 22, with genders of nouns as a clue.

Each set of words, selected from one of two menus, is grouped by theme – travel, sport, everyday expressions and so on. The user translates the words into German, and is then told whether the answers entered are right or wrong.

Motivation comes in the form of a castle you are trying to build.

When you've completed it, you're rewarded with 18 seconds of Beethoven's "Ode to Joy", some matchstick soldiers appear next to your picture, and you're told how many days – attempts – it took you to complete the job.

The program is not exactly innovative. In fact it's neither particularly imaginative nor terribly exciting. The best that can be said about it is that it's perfectly respectable.

True, there has been some attempt to make use of the micro as an educational medium, for example, an authoring facility allows teachers to create their own sets of words. But the overall impression is that the package has been rather

→

From Page 51

artificially pepped-up.

Now, when it comes to evaluating learning packages for young people, the only significant test is the extent to which incentive is maintained. The most conspicuous reaction to Das Schloss from my seasoned team of guinea pigs was that interest was soon lost in rebuilding the rather unimpressive castle from scratch with each set of words.

Despite an initial appeal, therefore, it's really not much of an educational carrot.

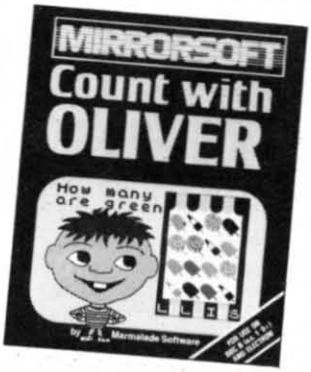
This is not the devastating criticism it may seem to be. As compared to other schoolware, German is relatively poorly served in computer-assisted learning, and there are programs on the market which almost defy belief in their shoddiness.

Das Schloss is far from being one of them, and can be recommended on those grounds alone.

Gabriel Jacobs

You can count on this one!

COUNT with Oliver from Mirrorsoft consists of two entertaining games – Toyshop and Lollipops – which introduce the basics of counting, simple addition and subtraction.



The games are intended for four to seven year olds and are both attractively presented and easy to use.

In Toyshop, little red headed Oliver asks the young player to help him count toys in a shop window. The print used is large and easy to read, and the program is carefully graded to gradually get more difficult as the child masters each stage.

Three different kinds of toys in three colours are used, introducing the ideas of sets as well as numbers, by questions like "How many green toys?" as well as "How many boats?"

In Lollipops, Oliver is at the sweetshop, asking for lollipops of different shapes and sizes. Addition follows naturally as Oliver collects different sorts of lollipops, as well as subtraction when he eats some!

As the game progresses,

QUICK RUNS

A first look at some of the latest releases

Time Lords: *A strategy game for one to five players in which each adopts the role of a Time Lord representing one of the main races of the universe. They must travel through time and space colonising planets and fighting wars, in a life or death struggle for survival. The game ends only when all the Lords are dead or exhausted.* (Redshift).

★ ★ ★

English Civil War: *In this strategy game for two players you control the disposition of your forces in an attempt to secure victory for your side. Movement of your men is displayed in graphic form. Deploy your musketeers, pikemen, cavalry and artillery as you try to either capture or destroy the enemy fort, or reduce your opponents' will to fight.* (Redshift).

★ ★ ★

Islandia: *A game of military and economic conflict for two to four players. By adopting the role of a trading company, each player must attempt to gain control of islands with the potential to generate great wealth. The winner is the company with the largest amount in the bank at the end of the game.* (Redshift).

★ ★ ★

3D Space Ranger: *Flying your starship along the encircling planetary trench you must save Earth from invasion by the Cyborg Empire. Surrounded by asteriod belts and defended by squadrons of android craft, the Death Stars advance. Monitor your energy levels and conserve sufficient to escape after the attack.* (Microbyte).

★ ★ ★

French Revision: *A suite of educational programs aimed at providing extensive revision for students preparing for the 16+, CSE and 'O' level exams. Students are given practice at completing sentences using vocabulary, phrases and idioms. There are four grades which can be purchased singly, in pairs, or as a complete set.* (Dean Assoc.)

★ ★ ★

Mastermind: *For up to four players, the program simulates BBC TV's most popular quiz. You get two minutes on your chosen subject and two minutes on general knowledge. A second cassette contains the database with specialist questions on films and TV, sport and games, and a bank of general knowledge questions.* (Mirrorsoft)

★ ★ ★

Know Your Own Personality: *Find out your own personality with a program based on the famous Pelican book of the same name. The book's three most important tests and all seven aspects of personality are included. A total of 21 individual traits are presented in bar-chart form and the results can be saved or sent to a printer.* (Mirrorsoft)

★ ★ ★

Know Your Own PSI-Q: *In this computer investigation of psychic ability you can test whether you, or your friends and family, can predict the future or see the unseen. The program uses entertaining and scientifically researched card and shooting games to check these abilities.* (Mirrorsoft)

★ ★ ★

Bank: *Gives accurate information of in and outgoings of any number of bank accounts. Warns of amounts payable during the next seven days and allows full listing of all standing orders recorded. The program can deal with upto 50 standing orders and 200 transactions during any given financial year. (Diamant-soft)*

★ ★ ★

Polar Perils: *Adrift on an ice floe in a perilous sea you must return to your homeland. You are chased by a ravenous polar bear and must leap from floe to floe to find a spear to kill it. Can you later tread your way past the thin ice or face the perilous kayak voyage? Even if you manage all this* greedy Oliver gradually gets bigger and bigger, with predictable consequences as he turns various unhealthy colours.

Both programs provide a good aid to simple arithmetic, with clear graphics and amusing illustrations.

Jane Jackson

Take to the sky – astride an ostrich

WINGED Warlords is an arcade game in which you are invited to take to the skies – but not in your Cobra Mk 3 with military lasers. This time you are sat astride a great big ostrich with a lance tucked under your arm.

Yes, now is your big chance to display your skills in the medieval sport of jousting.

The battlefield is a large open sky in which hover several platforms. The platforms, should you manage to fly up to one, are ideal places upon which to lie in wait for a passing warlord.

When tackling an opponent it is the player with the highest lance who will be the victor.

The key to success in this game is definitely your ability to master the art of flying. The controls are simple: left, right, and flap.

Flapping however is not that simple. This is probably understandable, the ostrich being a flightless bird.

The rapid fire technique that has served us all so well through the years is quite useless. Superior Software give a hint on the cassette inlay: "Imagine you are an ostrich trying to fly".

Slower, stronger, key depressions are far more effective. This, however, is very difficult to remember when a warlord is bearing down on you and you can't get the thing off the ground.

A successful clash with a warlord results in him reverting to his original form – an egg. You must, at some time during the melee, make contact with the egg or it will hatch to produce a new adversary.

At the base of the screen is a

→

there are more hazards to come. (Squirrel)

★ ★ ★

Jack and the Beanstalk: *Your object is to climb the beanstalk and bring down the bags of gold but the giant will chase you at every opportunity. If he reaches your home ground you will die so you must force him back by chopping down the stalk. You can later dig holes to kill snails and slow him down.* (Superior)

★ ★ ★

Filewriter/Cloze Test: *A disc-based educational package consisting of Filewriter: a word processor designed to allow young people and teachers to write, edit, save and print text as required; and Cloze Test: for use by the teacher to test procedures written with Filewriter.* (Cyclops)

★ ★ ★

Typing: Keyboard Skills: *A versatile keyboard course designed for anyone who wants to learn to type quickly and efficiently. Equally suitable for beginners, refreshers, or those who just want to improve. The program is self-pacing and shows speed and percentage accuracy.* (Pitmansoft)

★ ★ ★

Zany Kong Junior: *In this multi-level game the evil Morris has kidnapped Zany Kong. As his offspring your task is to collect the keys and release him from the steel cage which imprisons him. Your only way in the early stages is to swing from the vines, avoiding the snappers, ardvark birds and electric spikes. Unfortunately you have a time limit in which to do it.* (Superior)

★ ★ ★

Space Pilot: *As a fighter pilot you must face five waves of action, each representing a different time period. There are first world war biplanes, second world war Spitfires, helicopters, jets, and UFOs. The action starts with the biplanes and only when they are destroyed can you progress to the next screen.* (Superior)

★ ★ ★

Star Warp: *Your task is to defend your homeworld from the alien attack. Your view through the front screen enables you to sight on your enemy as you attempt to destroy them. If you let your lasers' temperature rise too much, they cease to function.* (Superior)

★ ★ ★

Airlift: *You are the pilot of a rescue helicopter. After the tanks have bombed the houses you must attempt to save the hostages by delivering them to the Red Cross hostel. You can bomb the tanks but great care must be taken not to kill any hostages accidentally. Watch out for the auto-gyro and the killer satellite.* (Superior)

★ ★ ★

Moneywise: *With 52 categories and bar charts you control your accounts in the bank and building society, and your credit card, household and personal budgets. The program is menu driven with all standard options.* (Squirrel)

★ ★ ★

Games Collection: *A collection of the Basic programs. Test your reflexes on arcade-style games or test your wits on strategy games. There is an accompanying book of listings available which includes programming techniques.* (Century)

★ ★ ★

Er*bert: *Move Herbert around his pile of coloured blocks changing the top surface as you land. You must avoid at all times the snake, the bouncing ball and the gorilla. Take a helicopter ride to safety and collect bananas for bonus points.* (Microbyte).

★ ★ ★

Pinball: *A computer simulation of the popular arcade pastime. Includes buffers, flashing targets, bonus points, ball strength control and left and right flippers.* (Microbyte).

From Page 53

lava pool, covered by a layer of rock during the first screen. In subsequent screens it has no such covering and is to be avoided at all costs.

Even a low pass over the lava may entice the pool's inhabitant to make a grab for your steed. Once in the grip of the beast your only hope lies in your mastery of the powerful flap.

I enjoyed this game thoroughly, and so will you.

James Riddell

- A FAST-MOVING GRAPHIC GAME OF SKILL AND STRATEGY -
THE
EVIL DEAD

You've read the book, seen the film, but...

HAVING been a horror movie fan since seeing my first black and white Frankenstein film, I was intrigued to see how well such a movie could be converted into a computer game.

The story line of **The Evil Dead** from Palace Software is described at length.

In a nutshell the story is as follows: Ashley, the hero, and four friends are on holiday in an old shack which just happens to be haunted.

Whilst exploring the shack they discover the book of the evil dead, and by reading from the book they summon up an evil spirit. The windows of the shack fly open and the spirit enters the rooms causing all except Ashley to mutate.

Using an assortment of weapons Ashley attacks and dismembers the mutants. But your common or garden mutant doesn't give up that easily.

The disembodied limbs are soon back on the trail of our axe wielding hero. Now that's what you call a story line.

The shack is viewed from above in the form of a floor plan, architects' style. The actual playing area is spread over three screens which was the first of the programs failings.

As you approached the edge of the screen everything stopped moving and the whole screen scrolled to one side revealing more of the shack.

A Defender style scrolling action would have been far less irritating.

One of Ashley's tasks is to race around the shack closing the continually opening windows to keep out the evil spirit. Points are awarded for every window closed.

However window closing is soon forgotten as the friends – or is it fiends? – begin to mutate.

Grabbing any available weapon you begin to attack the green mutants: herein lies the program's second failing.

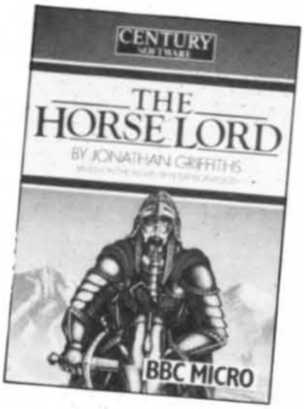
Whether you were attacking a mutant, or vice versa, the result of the encounter was the same – the program merely printed a brightly coloured flash at the side of the character.

It was therefore very difficult to tell who was attacking who.

All in all, I was not too impressed.

As they say in the movie business, you've read the book, you've seen the film, but don't rush out to buy the program.

Jon Revis



Can't beat a bit of gore

AS Aldric, the horse lord, you have been given the task of delivering a message to the

Fractions can be fun – almost!

FRAC Attack from Shards Software is an attractive, well polished package of six routines designed to help 8-14 year olds understand and use fractions.

Each routine has a range of difficulty to allow the user to select questions appropriate to their abilities. The collection is menu driven and very friendly – it can almost convince you that fractions are fun.

In Shady Fractions part of a rectangle is shaded and the player has to identify the fraction and type in the numerator or denominator, or in some cases the ranges of equivalent fractions.

The second routine – Frac Attack – gives practice in working out fractions of a given number. A sum is given such as '2/5 of 25', and the player has to bomb two incorrect answers carried on a train across the screen and rescue the right answer.

More or Less continues ideas about equivalence – the player must compare two fractions and make a valid statement by inserting <,>, or = between them. The correct answer helps a boxer register his strength on a punch machine – the faster the answer the harder the punch.

FRAC ATTACK
Part of the Fun To Learn series
SHARDS

Higher levels include top heavy fractions and mixed numbers.

In Beam Up, the player must successfully answer four questions to allow a stranded spaceman to beam up to his ship. A block of yellow rectangles is shown, some of which turn red. The player answers Y or N until the displayed numeric fraction correctly matches the pictorial display.

But if the player takes too long to think, then the stranded spaceman can only jump up and down, looking very frustrated.

Strong Arm is similar to More or Less, but the player is presented with a statement such as '12/15 = 4/*', and must enter the missing number.

Difficulty levels include simple, top heavy fractions and mixed number, providing a very good reinforcement of the golden rule of fractions.

The last routine – Hungry Radish – is the silliest of them all but by far my favourite. You have to enter the name of someone you'd like to see eaten.

Then you must make Hungry Radish choose which is the larger of two fractions – if you're right he eats up your chosen victim with a big smile and a lick of the lips.

Altogether, an excellent selection of programs which make full use of colour, graphics and sound effects. Disc users can easily transfer the programs for quicker loading, an idea which ought to be more widely adapted.

Highly recommended for a fun way of helping and amusing the fraction-wary.

Jane Jackson

castle. However to reach your destination you must travel through enemy territory, and fight every step of the way.

The Horse Lord (Century) is in two stages. In the first one the screen appears rather like a board game viewed from above. The screen displays the route to be taken, the obstacles to be overcome, and finally the castle.

At this stage the user has very little to do but determine the speed at which Aldric reaches his next encounter.

This however is still important as Aldric's journey is against the clock. Take too long and the little chap falls over and spurts blood – you can't beat a bit of gore.

The second stage is entered once Aldric reaches an obstacle. At this point we are given a close up view of Aldric and his opponent. Both are large but not very detailed characters.

By pointing your sword at the enemy and banging the Return key like a madman you will soon hack him to bits. The only problem with sword play is that you tend to get hit, 10 such hits and you return to PROCspurt_blood.

Other obstacles do not involve fighting. For example, there are water jumps, and these are often the more fatal than the fights. Speed and timing are essential for a good clearance otherwise it's four faults and back to square one.

As you progress through the game you will find you have to take on opponents in pairs, and even purple horses!

These race around the screen loosing arrows willy nilly. You will probably find that two horses are no more difficult to overcome than one, because they invariably end up shooting each other.

The game was inspired by the book of the same name. I only hope the book was more exciting.

James Riddell

Help Tubby bag a brace

THE 'poultry' task assigned to you in **Duck!** is helping Farmer Tubby bag a few ducks for his dinner.

Firebird Software's policy is what you see is what you get which means we get a screen snap and a price tag of £2.50.

Economics aside, it's quite a fun game. You move Farmer Tubby along the bottom of the screen firing at the ducks fluttering about above you.

The occasional swan graces you with its presence – bag it for a few more points. The critters obviously descend quickly once they're shot so if you don't get out of the way, they land on you.

At this point you fall down and stars spin round above your head to the accompaniment of various twittering sounds. Once you've cleared the skies, a more ferocious menagerie appear.

BBC Micro B
DUCK!
A MUSICAL COMEDY
FIREBIRD

These feathered fiends drop eggs which, though yielding points if shot, will hatch and spawn an extremely awkward bird that bounces around the screen with intent to inflict grievous bodily harm to our hero – you!

I'd say it's a game that will appeal to the youngsters and at £2.50 it's excellent value.

Philip Tudor

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Any improvement on Britains' No.1 word processing ROM...

WORDWISE was the very first ROM based product to be made available for the BBC computer and over the last couple of years it has become the most popular word processing system for the BBC machine with almost 50,000 chips now sold.

It has consistently received excellent reviews for its ease of use and speed. It takes only minutes for the user to become familiar with a powerful professional word processing system.

Wordwise Plus

WORDWISE PLUS is now available extending the original program in many unique directions. Not only is the program now twice the size but the package includes two completely new manuals — an introductory manual that gently introduces the newcomer to word processing with WORDWISE, and a reference manual listing all the commands.

THE WORDWISE PLUS PACKAGE CONTAINS

1. **16K ROM**
2. **SPIRAL BOUND REFERENCE MANUAL (180 Pages)**
3. **INTRODUCTORY MANUAL (56 Pages)**
4. **KEYSTRIP**
5. **TYPING TUTOR PROGRAM (On cassette)**
6. **EXAMPLE TEXT (On cassette)**
7. **EXAMPLE PROGRAMS enabling mail merging, index generation etc.**

Typing Tutor Program for
Wordwise Plus

WORDWISE PLUS is completely compatible with all older versions and is able to use existing WORDWISE files without modification.

WORDWISE PLUS FEATURES

Over the last couple of years we have received countless suggestions for ways of extending or adding new facilities to WORDWISE. It soon became obvious that we would not be able to implement every single suggestion. Indeed, each person uses a word processor in a different way — each individual has differing requirements — a feature that one person may think essential another may have no need for.

We have overcome this problem in two ways. Firstly we have included the most commonly requested additions and improvements. A number of new editing features and a few more embedded command have been added.

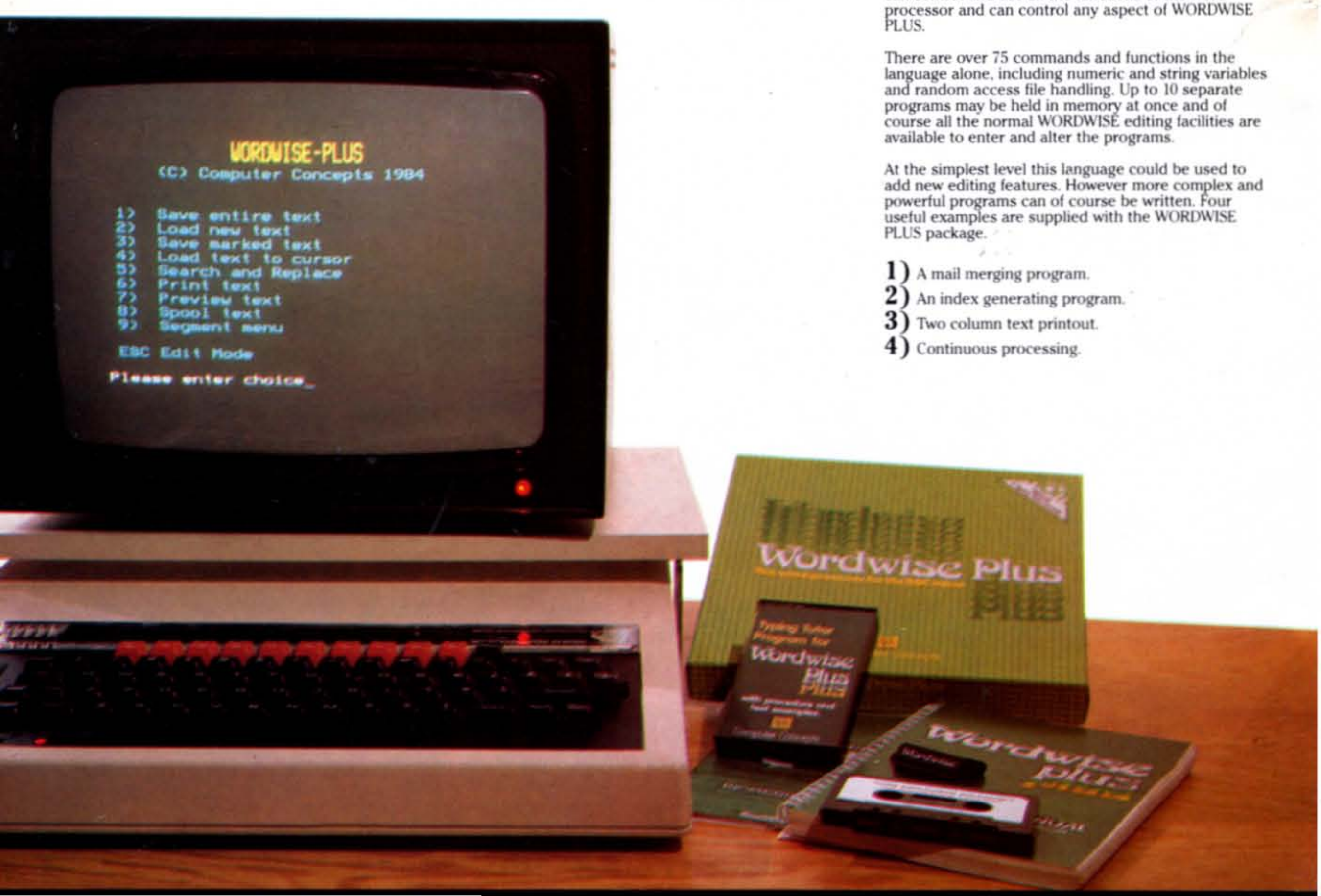
Secondly a unique BASIC-like programming language has been incorporated. This facility enables the capabilities of this word processor to be extended in an infinite number of ways.

The language itself has been designed, like WORDWISE, to be simple to use and understand. Many of the commands look and act like BASIC commands and so will be familiar to many users. However the language can control and use all the functions of the word processor and can control any aspect of WORDWISE PLUS.

There are over 75 commands and functions in the language alone, including numeric and string variables and random access file handling. Up to 10 separate programs may be held in memory at once and of course all the normal WORDWISE editing facilities are available to enter and alter the programs.

At the simplest level this language could be used to add new editing features. However more complex and powerful programs can of course be written. Four useful examples are supplied with the WORDWISE PLUS package.

1) A mail merging program.
2) An index generating program.
3) Two column text printout.
4) Continuous processing.



```
WORDWISE-PLUS
(C) Computer Concepts 1984

1) Save entire text
2) Load new text
3) Save marked text
4) Load text to cursor
5) Search and Replace
6) Print text
7) Preview text
8) Spool text
9) Segment menu

ESC Edit Mode

Please enter choice_
```

....Must Be A Plus

Word Processing With Wordwise

All the advantages of a ROM - instantly available. One command and your BBC machine becomes a powerful word processing system.

Fast and very simple to use.

The more complex commands are menu driven, enabling those totally unfamiliar with this software to use these more powerful features straightaway.

The function keys are used to full effect with a keystrip clearly showing each function.

Block copies and moves. It is possible to mark any part of your text, this marked section may be instantly moved or copied to any other part of your text. This cut and paste type of operation is a vital part of all word processing operations and with WORDWISE it is simplicity itself.

Automatic headings, footings and page numbering. When printing a document many pages long it is possible to have WORDWISE number the pages for you and put any heading or footing line on each page.

Unique word counting feature. Ideal for journalists, it constantly displays the current number of words typed. It also allows word counting for specific sections of a document.

Works with all filing systems, such as DISC., CASSETTE., and the new ADFS. Works with any printer that works with the BBC machine (most do) and is able to access the special features of any printer (italic, subscripts etc). There is no need to buy additional printer driver programs.

Here are a few of the things that have been said about WORDWISE.

"WORDWISE offers an extremely user friendly program ... it would make an excellent choice for someone rather apprehensive about word processing."
.... E & CM

"WORDWISE has won a devoted fan club because of its flexibility and ease of use."
.... Practical Computing

"On the whole WORDWISE is an excellent wordprocessor .... WORDWISE is thoroughly recommended."
.... VIEWFAX 258

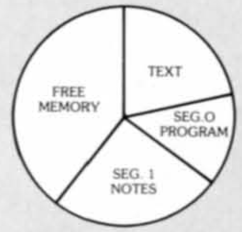
"WORDWISE is straightforward, friendly and excellent value."
.... Practical Computing

"... it is ideal for the home hobbiest and small businessman."
.... A & B Computing

Word Processing with Wordwise Plus

WORDWISE-PLUS still has WORDWISE as its core therefore it is still very user friendly and retains all the features that made WORDWISE the most popular word processor. It now has many new additions making this the most flexible word processor yet.

WORDWISE will continue to be sold alongside WORDWISE-PLUS. For those more specialised users who require the added flexibility here are a few of the new features.



Segments

When using WORDWISE PLUS, the BBCs memory is divided between your text and up to 10 'segments'. Each segment may contain either a program or just normal text. It is therefore possible to store and edit up to 11 separate documents in memory, or 1 document and 10 programs, or any mixture.

Often when writing letter or articles it is useful to keep a notepad, outlining what you intend to write. In WORDWISE PLUS one of the segments could be reserved for an electronic notepad. It would be a simple matter to switch between your 'notepad' and your main document with just a single key press.

Some of the New Editing, Embedded Commands and Wordwise Extensions

WORDWISE-PLUS works with the 6502 2nd processor. This allows more text to be stored in memory and 80 column previewing no matter how full memory is.

New embedded command FI will fully indent text against the right margin.

New commands for underlining and bold printing. The bold and underline effects are shown on screen - and it is a simple matter to configure these features for any printer.

Saving and loading of text is now up to 10 times faster on disc, and now the computer gives the user a warning if a document is going to be overwritten on the disc or in memory.

There is now a working filename - i.e. WORDWISE remembers the name of the current document being worked on.

New command deletes markers automatically.

It is now possible to print or preview a file directly from disc without having to load it first.

New embedded command 'PS' allows strings to be inserted into the text when it is printed.

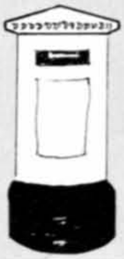
New embedded command 'PF' will read a document from file while printing and interpret any embedded command in that file.

Improved search and replace facilities now include wild-cards.

Example Programs Supplied With Wordwise Plus

1) A mail merging program that allows names and addresses to be added to a standard letter. This is a relatively easy job with this language.
2) An index generating program. This finds keywords and generates a separate index listing the word and the page numbers where the keywords occurred.
3) Two column printout. This program will print your text in two columns across the page.
4) Continuous processing. This enables the disc user to process and edit extremely large documents spread over several files as if it were one continuous document in memory.

Upgrades



WORDWISE PLUS for only £17.00+VAT.

Existing users of WORDWISE can upgrade to WORDWISE PLUS for £17 +VAT (£19.55). We are only able to offer this service through ourselves at the address below. Please return the old WORDWISE package complete with chip (suitably protected for postage) and the manual with your cheque or P.O. or quote your Access or Barclay number. We will then send you the complete new package.

In The Near Future

HI-WORDWISE for 2nd processors that allows even more user memory, supplied on disc for less than £5 to WORDWISE-PLUS owners.

A FAST SPELLING CHECKING PROGRAM

Both WORDWISE and WORDWISE PLUS are available from all good computer dealers. Alternatively you can obtain these directly from Computer Concepts.

WORDWISE-PLUS £49.00 +VAT (£56.35)
WORDWISE £39.00 +VAT (£44.85)

Computer Concepts

VISA

Computer Concepts, Gaddesden Place,
Hemel Hempstead, Herts HP2 6EX
Telephone: (0442) 63933

Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

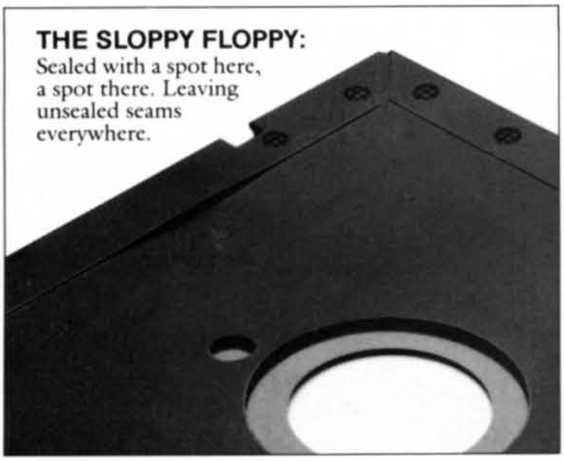
Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.



THE SLOPPY FLOPPY:
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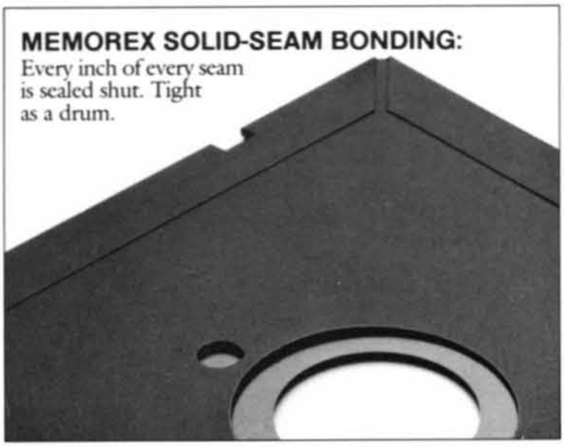

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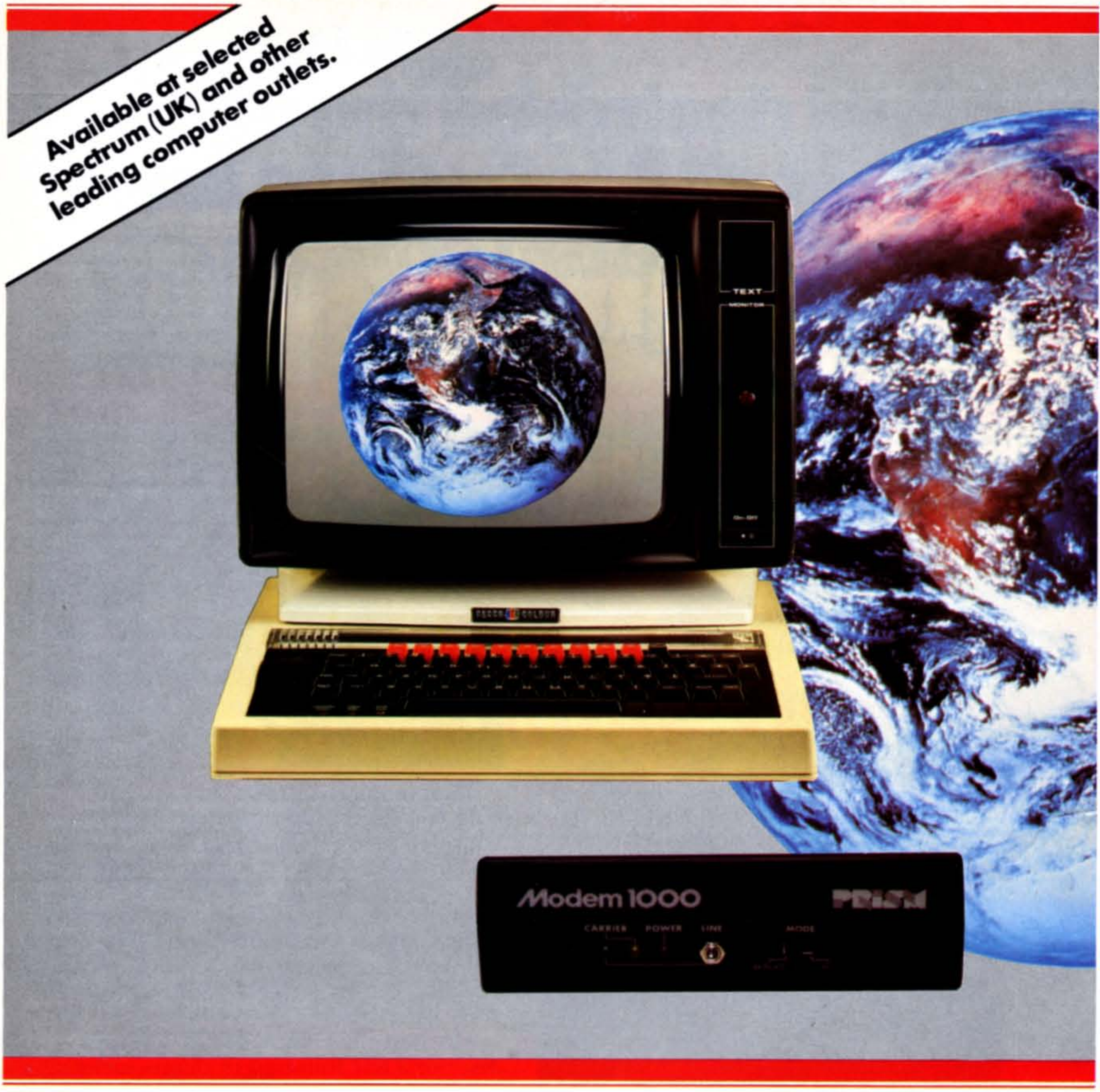
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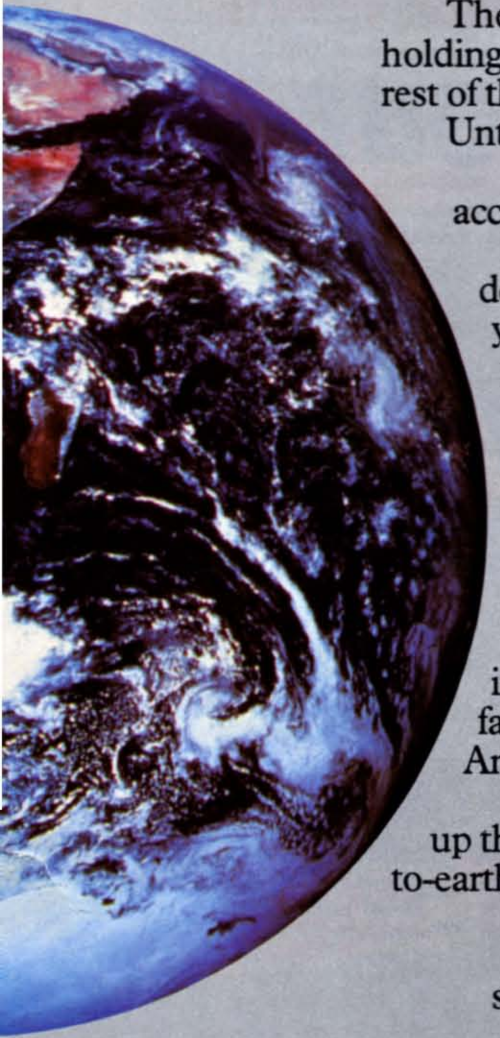

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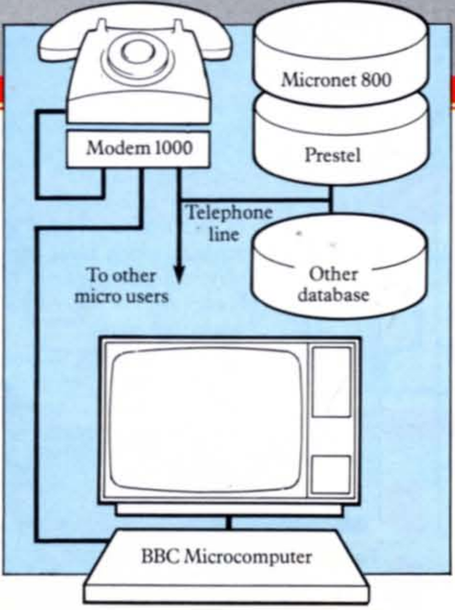

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Dumpout 3 is a real winner

– says MIKE MAHON

IN the August issue of *The Micro User* I reviewed two screendump ROMs from Watford and finished by saying that a utility with "... the versatility of Dumpout 2 with the added speed and Mode 7 dump of Epson Dump – plus a Mode 7 multitone dump would be an all out winner". Well, here is that winner.

Dumpout 3 is Watford's latest printer utility ROM which offers all the features mentioned above – and more!

Dumpout 3 (version 3.0m) is an 8k eprom which comes with a comprehensive 25 page manual which at first sight seems daunting. However the commands may be learnt very quickly and used successfully in a simple fashion or studied carefully and provide some rather sophisticated screendumps.

There are four main commands – *GIMAGE (for graphic dumps), *TIMAGE (for text dumps) and also *GWINDOW and *TWINDOW to set the screen windows for these two dumps respectively.

Commands may be used in abbreviated form (for example, *G.) or prefixed with W to avoid command clashes with other ROMs.

The window setting commands are quick and easy to use, both in direct or program mode. The corners of the screen to be dumped to the printer are automatically marked and may be altered using the cursor keys. Alternatively the text or graphic coordinates may be set as X and Y values and included as parameters to the dump commands *GIMAGE or *TIMAGE.

This is a very useful facility, as portions of a screen excluding unwanted prompt messages may be printed (see Figure III). In addition, the windows were much easier to set up than with Dumpout 2.

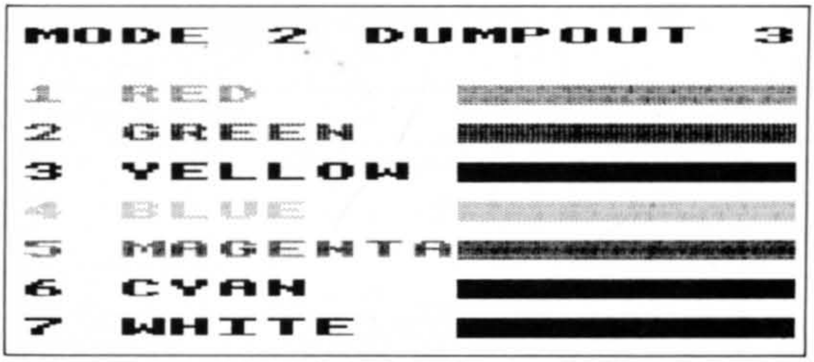
*TIMAGE will carry out a fast full screen printout of text in any mode in around 10 to 20 seconds depending on the mode used. The dump command does not require any parameters to be set for a full screen dump although the user may optionally set X and Y coordinates for a partial screendump or ask for a specific indent from the left paper margin.

Producing high resolution paper copies of graphic screens in any mode will be the major reason for buying this ROM, and this is where Dumpout 3 performs *par excellence.*

The graphic dump command *GIMAGE may be followed by up to 15 parameters, though they do not all have to be used together. At its simplest only the printer type needs to be specified.

For comparability to the previous review an Epson FX80 dot matrix printer was employed throughout this test. Therefore a graphics screen would be dumped by the commands *GIMAGE EPSON.

Dumps in modes 0, 1, 2, 4 and 5 took around five and a half minutes on the Epson printer. Like the two previous screendump ROMs, full multitone dumps of the colour screen were



MODE 2 DUMPOUT 3

1 RED

2 GREEN

3 YELLOW

4 BLUE

5 MAGENTA

6 CYAN

7 WHITE

Figure I: Dumped three colour tones

P	*When using less than 7 colours Dumpout selects the shades with the widest brightness separation. P may be used to alter this by changing from logical to physical colours.*
T	*Replaces a multitone dump with a high resolution two tone dump.*
G	*Changes a multitone dump to one with a positive grey scale in which black on the screen prints darkest. This is the opposite way round to normal printouts.*
M binary	*Facility to mask or select which colours are printed black or tonal and which are left unprinted as white.*
F	*Selects a faster lower density dump (mode 2*

*Table I: *GIMAGE parameters*

produced.

The dot makeup of the various tones differed somewhat from that of the previous ROMs, giving fine gradations of shading on paper (Figure I).

The most significant enhancement of Dumpout 3 over its predecessor and many other screendump utilities is the printing of full multitone screendumps of Mode 7 text and graphics (Figure II). This took about seven minutes to print on the Epson but was well worth the wait.

The versatility of Dumpout 3's graphic dump is most obvious when we look at the remaining 13 parameters which may be specified when using *GIMAGE. See Table I.

The versatility of *GIMAGE when using these parameters is amazing (see Figure III). Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography.

On the Epson FX80 printer standard graphic dumps were, without defining extra parameters, about 8in wide by 6in high. These dumps, in any mode, were incomplete, with the right hand side of the screen missing.

Rotating the dump through 90 degrees (R1) produced a full screen dump about 7½in × 7½in with a pleasing aspect ratio. Alternatively adding the F parameter produced a complete screen dump of the standard size (8in × 6in), or adding L, gave an elongated postcard size (5in × 7in) picture.

	screen in 3½ minutes) and prints full screens.
	Selects a linear step which alters the picture aspect ratio according to the printer used.
V hex	*Vertical scaling factor.*
H hex	*Horizontal scaling factor.*
R 0,1,2,3	*Rotates the dump through 0, 90, 180 or 270 degrees depending on the value of R and alters aspect ratios.*
X min max Y min max	*Defines the graphic screen coordinates of the area to be dumped.*
value	*Indents dumps from left paper edge in 1/10ths of an inch.*
E	*Enhances contrast for Mode 7 text and graphics.*
C	*Print separated Mode 7 graphics as contiguous.*

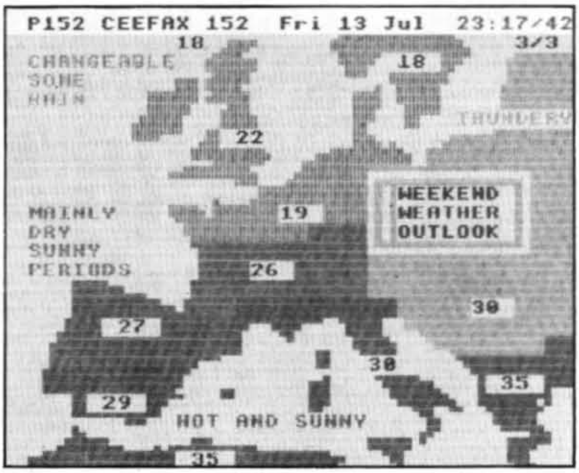


Figure II: Mode 7 multitone dump

Of course all these aspects and sizes could be varied enormously by specifying scaling factors – a recognisable Union Jack was printable over a magnification range of 1 to 500. Specifying V &CD or H &140 dumped screen circles as perfect circles rather than the usual ellipses on the Epson printer. These parameter values also gave the correct aspect ratio for the whole picture and were used for Figure II.

Finally, Dumpout 3 will cope with Mode 8 screens and also has two extra Osword features for dealing directly with Mode 7 pixels.

Dumpout 3 is said to cater for 15 (according to the manual) or 13 (according to the *HELP PRINTERS command) different printers. These are grouped into seven main classes the type of which must be specified following *GIMAGE.

As these categories include the Seikosha, Tandy, NEC, Epson and Shinwa range of printers, most users should be satisfied.

Without reservation I wholeheartedly recommend the Dumpout 3 ROM as the ultimate screendump facility for the BBC Micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing.

Whole, partial, rotated and scaled screens may be dumped to almost any BBC-compatible dot matrix printer. At around £20 it must represent excellent value for money and surely cannot be beaten.

As the code occupies only 5¼k of the 8k eprom perhaps even more enhancements are to come, for example an interrupt driven screen freeze/save/dump function.

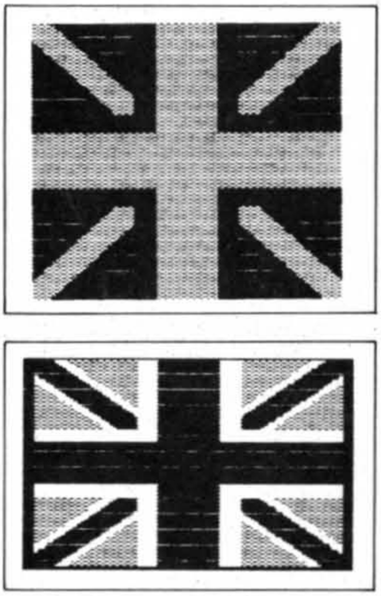
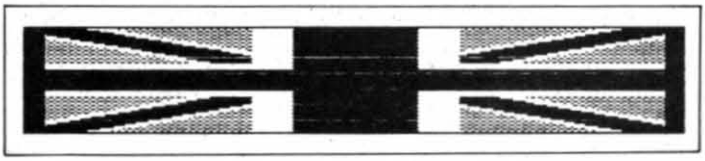


*Figure III: *GIMAGE versatility displayed*



Work faster with Multi-Forth

IT was once said of a president of the United States that he couldn't chew gum and walk at the same time. Well your computer is rather like that unless you fit Multi-Forth from Skywave Software.

For those of you who have not met Forth I must say you are missing something. It is a cult language, and like all cults its followers think it the best thing since sliced bread, and its non-followers just don't know a good thing when they see it.

I suppose you can tell I like Forth as a language. It is running on all the computers I own, and in fact nowadays I won't buy a computer that can't use it.

Forth was originally designed to control radio telescopes but since that obscure beginning it has spread into all the areas normally associated with computing.

It is a rather strange language when you first see it as it is based on a reverse Polish stack notation. For example to add up two numbers you need to type

```
5 7 +
```

This, when you think about it, is very efficient. It is in effect saying give me one number, now give me another, now what should I do with them? Ah, add them together.

You soon get the hang of this postfix (or backwards) notation and see the elegant simplicity of the language.

Forth is highly structured, no line numbers and no GOTOs. Instead a program is defined as a word rather like a procedure. Once defined that word becomes an integral part of the language and can be used in further definitions. This is known as an extensible language.

This is the great power of Forth, as for any given application the language grows towards that application.

For example, if you are interested in games then, after you have programmed your first one, you have most of the elements for your other games. The designers of the Atari large arcade games work in Forth to speed up development time.

Robotics and control also lend themselves to Forth and I have been doing a lot of work with large image processing, again in Forth. Also a music composition language has been written in Forth.

Well, that's the language. Let's look at this implementation of it. It comes as a 16k eprom and fits in the BBC Micro's sideways ROM sockets.

When activated it will ask if you want a cold or warm restart. A warm restart preserves the state of the computer, rather like pressing the Escape key in Basic, whereas the cold restart is like pressing the Break key.

The implementation has all the standard Forth words that you would expect to find in any implementation of the language, but what makes this one unique is its multi-tasking ability.

Multi-tasking is the trick of making the computer appear to do more than one thing at once. You do this by writing a program to do each task and then telling Forth to do them all at the same time.

Of course the computer has only one processor so it can only do one task at a time. So to make it appear to be doing several tasks simultaneously you need to interrupt the processor and tell it to change the program it is running.

If this is done fast enough the tasks appear to be running simultaneously. Obviously the more tasks that are being tackled the slower each one appears to be running.

However Forth is a fast language anyway – and think how many programs you write that have delay loops in them. Also a program might be waiting for a printer to become free or for input from a keyboard. With multi-tasking it can be doing something useful.

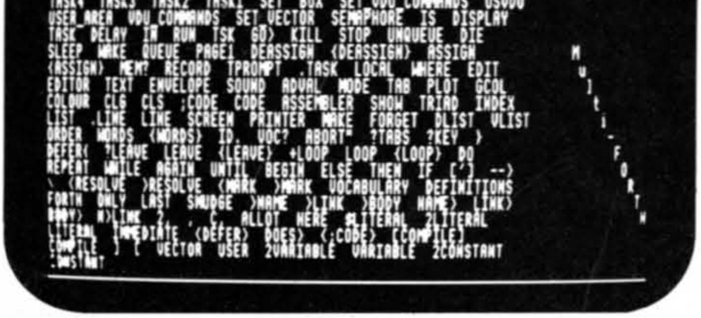
To achieve multi-tasking this version of Forth has two words – RUN and TASK. RUN causes a task to run continuously, and it can only be stopped by issuing a STOP command. This puts the task to sleep and can be started again with a WAKE command, whereas KILL will put a permanent end to it.

TASK works the same, but it can also accept interpretive instructions and, as such, uses more memory.

A conventional environment for multi-tasking is the multiple window type of display. This is where the screen is split up into several areas with a different task in each.

I have seen a very good demonstration with five windows, four showing tasks in operation and the fifth running Forth as you would normally. The other tasks included continuous display scrolling, a display of the time and a graph being plotted.

As each program takes a different amount of time to run, depending on



```
Multi-FORTH 83 Multi-FORTH 83
 Multi-FORTH 83 Multi-FORTH 83
  Multi-FORTH 83 Multi-FORTH 83
   Multi-FORTH 83 Multi-FORTH 8
3   Multi-FORTH 83 Multi-FORTH
83   Multi-FORTH 83 Multi-FORTH
 83   Multi-FORTH 83 Multi-FORT
H 83   Multi-FORTH 83 Multi-FOR
TH 83   Multi-FORTH 83 Multi-FO
RTH 83   Multi-FORTH 83 Multi-F
ORTH 83   Multi-FORTH 83
```

```
FORTH Vocabulary
TASK4  TASK3  TASK2  TASK1  SET  BOX  SET_VDU_COMMANDS  OSVDU
USER_AREA  VDU_COMMANDS  SET_VECTOR  SEMAPHORE  IS  DISPLAY
TASK  DELAY  IN  RUN  TSK  GO>  KILL  STOP  UNQUEUE  DIE
SLEEP  WAKE  QUEUE  PAGE1  DEASSIGN  (DEASSIGN)  ASSIGN
(ASSIGN)  MEM?  RECORD  TPROMPT  .TASK  LOCAL  WHERE  EDIT
EDITOR  TEXT  ENVELOPE  SOUND  ADVAL  MODE  TAB  PLOT  GCOL
COLOUR  CLG  CLS  ;CODE  CODE  ASSEMBLER  SHOW  TRIAD  INDEX
LIST  .LINE  LINE  SCREEN  PRINTER  MAKE  FORGET  DLIST  VLIST
ORDER  WORDS  (WORDS)  ID.  VOC?  ABORT"  ?TABS  ?KEY  )
DEFER(  ?LEAVE  LEAVE  (LEAVE)  +LOOP  LOOP  (LOOP)  DO
REPEAT  WHILE  AGAIN  UNTIL  BEGIN  ELSE  THEN  IF  [']  -->
\  <RESOLVE  >RESOLVE  <MARK  >MARK  VOCABULARY  DEFINITIONS
FORTH  ONLY  LAST  SMUDGE  >NAME  >LINK  >BODY  NAME>  LINK>
BODY>  N>LINK  2,  ,  C,  ALLOT  HERE  SLITERAL  2LITERAL
LITERAL  IMMEDIATE  (DEFER)  DOES>  (;CODE)  [COMPILE]
COMPILE  ]  [  VECTOR  USER  2VARIABLE  VARIABLE  2CONSTANT
CONSTANT
```

Multi-tasking in several windows at once how many programs are running, real time control could be tricky. However a word is included to produce time delays independent of the number of tasks being performed.

Multi-tasking is performed by the system interrupts. As such it will not work in the second processor, so if you have one it must be turned off, otherwise parts of the Forth will work but not all.

There is a way to get the second processor to service interrupts, but this requires a different approach and thus a different version. I am told that one is under development.

The documentation is always a good indication of the pedigree of a product, and the user manual that comes with Multi-Forth is very good. It stretches to over 170 pages and has an index – a rarity for manuals nowadays.

For all its length it does not pretend to be a manual that will teach you how to program in Forth, but rather is a full description of this particular implementation along with an explanation of multi-tasking.

I hear that there is to be an enhancement disc which will contain lots of useful extensions to the language, and the manual that accompanies it will delve even deeper into the intricacies of this implementation. If it is as good as the first manual it will be well worth it.

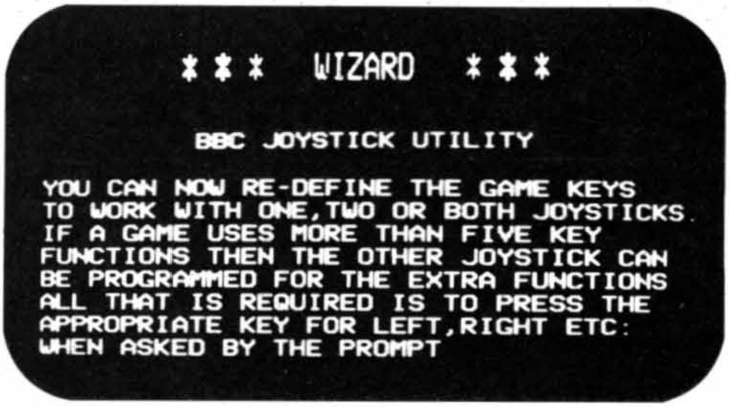
Well, who would find this language useful? Just about anyone who has a specific area of computing work. It could be a robot builder who wants to control several stepping motors simultaneously as well as keeping a lookout on the robot's sensors, or an experimenter who wants to control an experiment, gather data and store it onto disc all at the same time.

Although initially Forth might seem poor for business applications it is really quite good. How about writing your own word processor that can print a document while you are working on the next one?

In short, if you have something to do then Forth can do it for you. It is the only language I have ever used where non-trivial programs have worked first time!

Remember how you were when you just started learning Basic? You will feel like that again when you start Forth, but once mastered it will become second nature. I liked this implementation and I am thinking of making it the default language in my home machine.

Mike Cook



```
* * *    WIZARD    * * *

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```

Joyrom's initial instruction screen

Joyrom: good but greedy

JOYROM is a firmware utility which enables games without joystick routines to be played with joysticks. When I opened the neat box from Wizard Development, I was surprised to see a chip with only 24 pins, along with the simple instruction sheet.

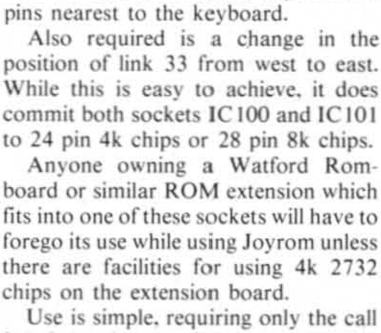
Fitting instructions are clear, directing the owner to fit the chip in one of the right hand pair of ROM sockets (easterly) with the notch facing away from the keyboard and the chip in the 24 pins nearest to the keyboard.

Also required is a change in the position of link 33 from west to east. While this is easy to achieve, it does commit both sockets IC100 and IC101 to 24 pin 4k chips or 28 pin 8k chips.

Anyone owning a Watford Romboard or similar ROM extension which fits into one of these sockets will have to forego its use while using Joyrom unless there are facilities for using 4k 2732 chips on the extension board.

Use is simple, requiring only the call *JS, *JS 1, *JS 2 or *JS 3. Although the manufacturers admit that each call allows Joyrom to work using different workspace, they omit to tell where!

The chip uses 20 or so bytes of workspace, at &0380, &09C0, &0A00 or &0880 respectively, according to the startup call used. In most cases it should not conflict with other games or utilities.



All instructions to convert key strikes to joystick movements are given on the screen and have to be followed before loading the program, so the user has to know the game commands in advance.

I tried Joyrom with 10 games and with nine of them the facility worked well, allowing my proportional joysticks to operate as switched sticks.

With the other game nothing different appeared to happen, the game functioning as normal, without joysticks. Joyrom needs to be reprogrammed for each new game even if they use the same keys.

I would recommend Joyrom but for the fact that it resides in a 4k ROM which limits the use of two of the four ROM sockets in the BBC Micro when installed to 4 or 8k, a point not made clear either in the advertising or instructions.

If the manufacturers had offered it on an 8k ROM or eprom so that it committed only one socket it would have been of more value.

However if the second socket contained one of the standard 8k utilities such as Wordwise, this would be no problem.

Ian Whitmore

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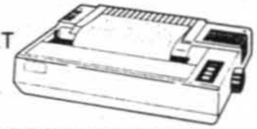

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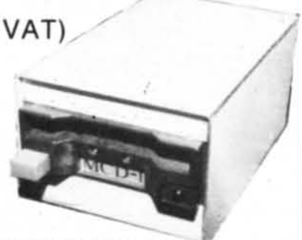

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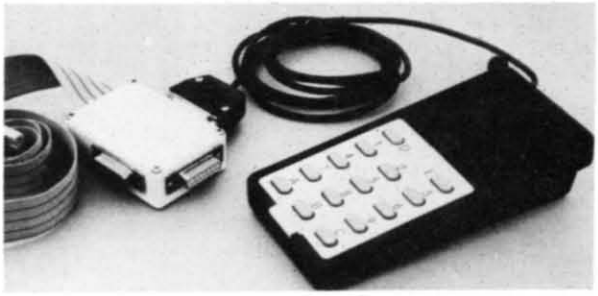

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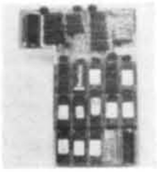

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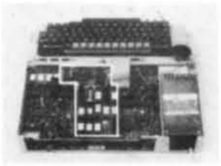

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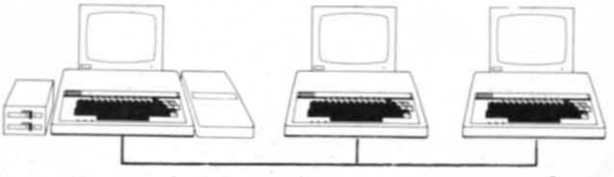

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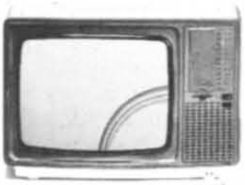

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Counting the moves to doom

ANTIGRAVITY, time reversal and black light all suggest that Peter Killworth has read Sylvie and Bruno by the Rev C.L. Dodgson of Oxford. Unfortunately, due to a lack of practical experience, he makes numerous mistakes with these "imponderals" and consequently I, an expert on such phenomena, have had a number of queries about Countdown to Doom (Acornsoft).

Having got out of the disabled spaceship (without steaming open the hints) you find a typical Killworth landscape.

The planet Doom really is a great place for a holiday – you can go every which way but down, and you are within easy reach of a swamp, a desert, a volcano and a glacier suspended over a jungle (maybe setting fire to the jungle will melt it? – after all Killworth IS an expert on convection currents).

Moving east you find a blob and a hole scooped in the ground. Now you might think that the contents of a "basin like cavity" are visible from the rim but I only went down to see if there was any open cast coal available.

Of course what I really wanted to find (and disable) was the pesky robot but the hints imply that the method is encoded in a 5 x 5 matrix which immediately suggests to me that a Playfair cypher has been used.

Actually Killworth could not use Playfair because pairs of similar letters have to be split by an X and an ambiguous code results thus:

NQ IR QY RA MN KG GV RQ NT YF PA MU ZU

The game has four or five mazes, all with different methods of solution. The orientation maze is particularly clever and it is interesting to see (feel) that the swamp has to be solved in the way I tried to map Snowball web.

Having blundered about for a couple of hours among the flora, fauna and physics of the planet, I expected at any minute to meet the brigadier from Monty Python who would stop the game because it was getting silly.

For a start you *can* see a black hole (cf. see a hole or shadow), you might even GET it, but it is an extremely dangerous thing to drop – far worse than a jar of orange marmalade because it would fall through the centre of Doom to the Antipathies and then, oscillating back and forth plus Coriolis force, would rub the whole planet away in a few years to eventually decay via Hawking radiation gimbling through the event horizon.

ACORNSOFT GAMES
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DUAL FORMAT
Countdown to Doom
for the BBC Microcomputer Model B

Incidentally, if there are gravity waves and/or particles (gravitons) how do they escape to cause the gravity effect of a black hole? I once asked Dr John Taylor and he didn't know. Does anybody?

Another bug is that having got the net and had a ride on a Sandworm with just my bare hands (so call me Leto) and returned through the jungle (so call me Jane) I say NET BLOB only to be asked what I want to do with the net. Don't take the question too literally since GET BLOB ain't the answer.

Having been caught by that bug we can then find an even bigger, more irate one. Go back in time and revisit the desert – the Sandworm doesn't realise this is a maiden trip so splat!

What you should have found is either an impassible lake or some useless sand trout. Having seen that bug off you then have to cut down the jungle, bury it, and, when your time trip is over, dig up the coal and burn it to melt the glacier. Such a possibility could give us all a job down t'pit till eternity.

There are numerous other errors and bugs in the game that make it a classic, and the hints can be even more confusing. For example you can SEE but how do you PUSH a shallow, shell-shaped, shelved hole? (And are these really the most common questions?)

Also the spacesuit behaves in a most peculiar and unreliable way should you enter the swamp too quickly or re-enter the "too dark to see anything" swamp after leaving the volcano.

Despite all these funnies the game is full of clever, original ideas like random computers, refusal to SAVE in some places then counting SAVE as a move in one situation but not in another, giving a problem that PEEKing can't solve.

Actually I didn't (couldn't) cheat. Acornsoft protection has improved a great deal but the program is obviously in Basic, for I can be back in time before the text has got out of the ship. The game has a move counter – does any reader claim a record low number of moves?

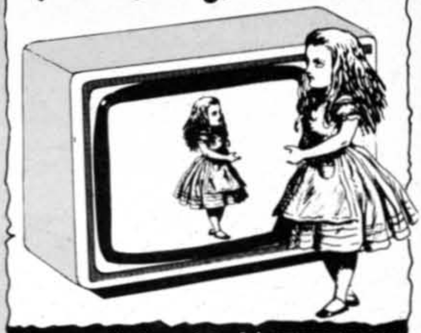
Problem with the vampire

KINGDOM of Hamil (Acornsoft) is part written by Killworth, so no graphics, interactive characters or complex sentences (good), just puzzles, problems, codes, mazes (groan) and a variety of deaths. The first attempt at hunting the Snark was no surprise as:

"In the midst of the word you are trying to say –
You softly and suddenly vanish away."

Incidentally, for those who keep fading away it's Peary, Polo, Columbus and Amundsen (not Scott) in the mural

Alice through the VDU



Our monthly foray into Adventure games

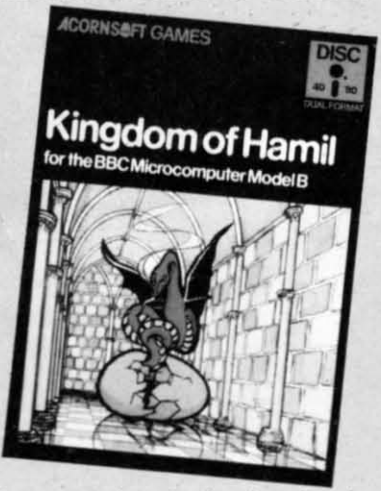
room. This kind of jingoism is what caused the Scott tragedy – a one day detour when two days from the Pole could have saved Scott three days and Amundsen a lot of misery.

There are puns (similar to Pierce O'Reilly for those who have read Finnigan's Wake from END to BEGINNING) and codes such as:

TPM WNLLZSAY HL WSZMA

but it took me a while to work out what THE PASSWORD IS ***** and even then I didn't see how to kill the vampire. Trouble is I always expect it to be more complex. It comes from reading Sherlock Holmes, Edgar Alan Poe and Jules Verne who all, at one time or another, explained how to crack simple substitution codes.

Of course they cheated, particularly Verne in "Journey to the Centre of the Earth". His hero gets the message backwards and still can't see it, but then what can you expect from a writer who thought it was Galileo who wrote down, in an acrostic code, that there is a ring around Saturn?



As we all know it was Herschel who hedged his bet on Saturn and (since I haven't got a hint sheet for this game) I also choose to play safe. However a wealth of clues are now available by browsing in your local micro magazine shop.

A year ago no answers were given "because it might spoil the game" and then someone realised that you could code them. Most codes are simple and can be read before the shop manager gets too irate but a number of readers couldn't reverse my encoder. A pity, since it was supposed to make you buy the magazine. So here is the encoder and decoder.

One reader did get it half right – he got the message (the pirate's pathword in Colossal Cave) but backwards, as Arne Sakussnam might have said: "muxelpreP ykcowrebbaJ noN".

Incidentally if you are stuck in The Castle of Riddles black maze try 8>KJD> 10= ,68)9#8 which even I can't debrowse.

```
  10 INPUT LINE hint$
  20 FOR P=LEN(hint$) TO 1 STEP -1
  30 char$=MID$(hint$,P,1)
  40 IF char$=" " THEN PRINT" ";ELSE
PRINT CHR$(ASC(char$)+P-32);
  50 NEXT P
  60 PRINT

  10 INPUT LINE hint$
  20 K=1
  30 FOR P=LEN(hint$) TO 1 STEP -1
  40 char$=MID$(hint$,P,1)
  50 IF char$=" " THEN PRINT" ";ELSE
PRINT CHR$(ASC(char$)-K+32);
  60 K=K+1
  70 NEXT P
  80 PRINT
```

Random slayings

GATEWAY to Karos (Acornsoft) is not by Killworth. He likes plenty of mazes and tricky puzzles in a small space whereas this game has 250 rooms but fairly laconic text and simple puzzles.

What I do detest is getting killed almost randomly and without much warning. I can sink softly into swamps, asphixiation is acceptable, poison almost palatable. But finding the entrance to the Hidden Valley in a wolf-ridden forest can be tedious, particularly as some important exits are not flagged.

One, quite irrelevant, puzzle is when the adventure begins. The notes say "sunrise on midsummer's day" and "midnight on the summer solstice". Asking the inhabitants of Karos merely reveals their one track minds.

Once again I haven't got a hint sheet and the program is in machine code (the text comes up very fast) so I haven't solved it – haven't got the time. What I do know is that the game takes place on an island with a valley and forest in the middle, mountains to the west and you can sail round the island and land on a couple of otherwise inaccessible places.

All this can be drawn as a very realistic map and so, for a change, I thought we would offer a prize for the best map of the island or, indeed, any adventure that you think is particularly visual. However a map for Hunting the Snark may be perfect but will draw a blank.

Amusing abbey

HAUNTED Abbey (A & F Software) has a dog and a blob, mazes and smelly things, clever clues and pustulent puns all packed into 66 rooms. Does Killworth moonlight? What would a Frenchman make of "For greater happiness turn right ahead" only to find a bust of the Mekon *(qui en enfer est-il?)* in a niche?

Should he swap his gold bar (heavy metal) for the trendy troll's personal stereo or the shades? Is the spelling "ricketty?" Is vertigo or acrophobia a fear of heights? An amusing middleweight with a plethora of violent deaths.

The program has an anti-theft device which prevent most normal(?) ways of having a look at it. However the Rev R. Redrup of Cornwall told me how to break it so I wrote to thank him and remarked that in Nelson's time the astronomical data for the Royal Navy was largely computed by Cornish clergymen, using seven-figure logarithms and prone to make the odd error themselves.

In 1808 the Peninsular War broke out and Spain made an uneasy peace with England. It was a difficult time for Captain Horatio Hornblower R.N., but his colleague Captain William Smythe was making a survey of the western part

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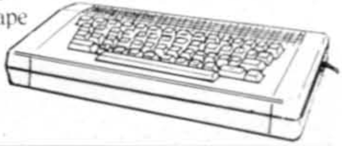

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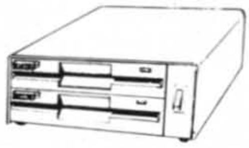

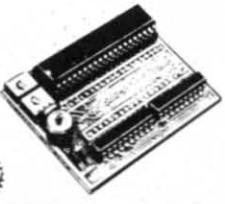

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From Page 69

of the Mediterranean when he also met a Spanish ship which, fortunately, knew about the new alliance.

The two captains exchanged presents. Smythe received a silver salver and, in return, gave the Spaniard a handsome leather bound set of the Nautical Almanac, a particularly notorious Cornish clergy effort. It omitted February 29 completely and no Englishman used it without double checking.

Smythe returned to England using the new French navigation tables, whereas the Spaniard was never seen again – R.I.P.

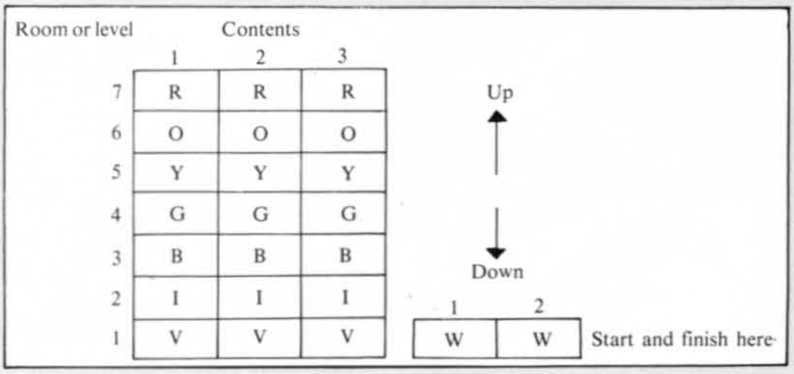
Rainbow riddle

FOR those who like real puzzles this month's problem is to Restore the Rainbow. Now a typical problem is to give the player only a limited number of moves to solve a problem (Killworth in particular is always handing out time bombs). Fail and something nasty happens in the woodshed.

The adventure writer often gives the player a couple of spare moves for luck and a SAVE usually allows the player to have an unlimited number of attempts to find a (usually) unvarying pathword – Hunting the Snark in Kingdom of Hamil is an exception (that's why he tells you not to SAVE in the mural room).

How about a problem where the path AND the number of moves varies every time, nevertheless the program knows exactly how many moves are required and chops accordingly?

The Rainbow puzzle illustrates this technique. I have written it as simply and as generally as possible so that it runs on almost any Basic system, but a clever programmer should really display the seven colours in three columns on the screen thus:



Room or level	Contents 1	2	3
7	R	R	R
6	O	O	O
5	Y	Y	Y
4	G	G	G
3	B	B	B
2	I	I	I
1	V	V	V

1	2	
W	W	Start and finish here

The above pattern is the final, target arrangement, but random numbers have galloped over the colours. To test the program replace line 120 with:

120 GOTO 180

and you should find the colours reversed (red at the bottom, violet at the top) with just 40 moves to sort them all our and stop at level 1.

You are allowed to swap any colour in a "room" with any colour you are "carrying" (the program prompts). Note that a counted move is either up or down and Geronimo if you go too far.

All you have to do is invent a couple of simple rules that will always restore the Rainbow in the given number of moves no matter how scrambled the colours – that is, design an algorithm that a computer could obey successfully.

Warning – most adventure writers could not solve this, so there is no prize for this sort of elevating puzzle.

ALICE

```
   10 ON ERROR GOTO 500
   20 DIM R(21),C$(7),I(2)
   30 C$(0) = "White"
   40 FOR I= -7 TO -1
   50 READ C$(I+8)
   60 FOR J= 1TO 3
   70 R(J+I*3+21)=-I
   80 NEXT J
   90 NEXT I
  100 DATA "Violet","Indigo","Blue","
Green","Yellow","Orange","Red"
  110 FOR I= 1 TO 21
  120 A=RND(20)
  130 B=RND(20)
  140 X=R(A)
  150 R(A)=R(B)
  160 R(B)=X
  170 NEXT I
  180 M=0
  190 FOR F= 1 TO 7
  200 U=0
  210 FOR I=1 TO F*3
  220 IF R(I)>F THEN U=U+1
  230 NEXT I
  240 M=M+INT((U+1)/2)
  250 NEXT F
  260 M=M*2
  270 R=1
  280 I(1)=0
  290 I(2)=0
  300 PRINT"Level ";C$(INT(R/3)+1);"
Moves left ";M
  310 PRINT"You see  1:";C$(R(R)); "
2:";C$(R(R+1));" and 3:";C$(R(R+2))
  320 PRINT"You have 1:";C$(I(1));" a
nd 2:";C$(I(2))
  330 INPUT"Up,Down or Swap ",C$
  340 IF C$="U" OR C$="D" THEN 400
  350 INPUT"Swap which ",X1,X2
  360 X=I(X2 MOD 3)
  370 I(X2 MOD 3)=R(R-1+X1)
  380 R(R-1+X1)=X
  390 GOTO 300
  400 IF C$="U" THEN R=R+6
  410 R=R-3
  420 M=M-1
  430 IF M>0 THEN 300
  440 FOR I= 2 TO 7
  450 FOR J=1 TO 3
  460 IF R(I*3-3+J)<>I THEN 500
  470 NEXT J
  480 NEXT I
  490 IF R=1 THEN PRINT"Well done,sun
shine!":STOP
  500 PRINT"Failed!!";:GOTO 500
```

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MU2/85

Start of a great new series!

Fast action – without the dreaded flicker!

BASIC is a simple yet very powerful language found on nearly all home micros, but there are times when it is just not practical to use. One such example is when we try to write fast action games.

Don't get me wrong, Basic is still very good for writing games – as you can see from the quality of those in *The Micro User*. But I'm sure there have been several occasions when you've wanted to move objects smoothly around the screen without the dreaded flicker.

Over the next few months I'll be covering all you need to know about writing machine code games – everthing from sprites to OSBYTEs.

The articles will be written assuming you know the basics of 6502 machine code.

Most games are written in Mode 2 because it offers a medium resolution screen with 16 colours. For this reason nearly all the articles will be devoted to writing games in Mode 2.

However, most of the programs can be adapted to work in other modes as they usually require only a few modifications.

Like all things, we have to start at the bottom and work our way up. This is why the first couple of articles will be concentrating on the configuration of the Mode 2 screen. We need to know how the screen is arranged before we can display objects on it.

I could throw you in the deep end by introducing a full machine code sprite routine, or a program to scroll landscape across the screen, but I'll leave them until we are in a position not only to do so, but also to understand how we're doing it!

As you may already know, the Mode 2 screen uses up 20k of memory to store the display. This 20k is known as the video RAM.

The start of video RAM can be found by printing the value of HIMEM – in Modes 0, 1 and 2 HIMEM is 12288 (&3000 in hex). The last byte of memory used by the video RAM in any mode is &7FFF – just below the sideways ROM area.

The Mode 2 display consists of 32 rows of 20 characters. The video RAM is divided up into strips which go across the screen from left to right, starting at the top left of the screen.

These strips directly correspond to the 32 character rows. Each row or strip of the screen takes up 640 bytes.

Since 20k is equal to 20*1024 bytes (20480), dividing it into 32 rows gives 640 bytes (&280 in hex) per row.

These strips are now split into 80 sets of eight vertical bytes (8*80=640) to give 80 columns. This is getting a bit complex so it's time to simplify things – see Figure I.

This shows the top of the Mode 2 screen – assuming no scrolling has occurred. If it has the start address will be different, but the screen will still be organised in much the same way.

The top left location is &3000 (HIMEM) the next location down is &3001 and so on down the column to location &3007. At this point the next location down is &3280 – note that this is on the next character row.

Surely, it would be more logical if this had been location &3008? Maybe, but the way the screen has been arranged on the BBC Micro is very useful, as we will see in future articles.

If you look back to the first row, to the start of the column right of location &3000 you will see location &3008. Now go down from here and you will find &3009, &300A and so on down to location &300F.

Again, after eight bytes we start a new column on the same row. This is repeated 80 times on each row.

After 80 columns we start at the beginning of the next row down. The second row is arranged in the same way as the first – this time the row starts at location &3280, &3000+(80 columns *

	COLUMN					
	0	1	2	– – –	78	79
HIMEM →	&3000	&3008	&3010	–	&3270	&3278
	&3001	&3009	&3011	–	&3271	&3279
	&3002	&300A	&3012	–	&3272	&327A
ROW 0	&3003	&300B	&3013	–	&3273	&327B
	&3004	&300C	&3014	–	&3274	&327C
	&3005	&300D	&3015	–	&3275	&327D
	&3006	&300E	&3016	–	&3276	&327E
	&3007	&300F	&3017	–	&3277	&327F
	&3280	&3288	&3290	–	&34F0	&34F8
	&3281	&3289	&3291	–	&34F1	&34F9
	&3282	&328A	&3292	–	&34F2	&34FA
ROW 1	&3283	&328B	&3293	–	&34F3	&34FB
	&3284	&328C	&3294	–	&34F4	&34FC
	&3285	&328D	&3295	–	&34F5	&34FD
	&3286	&328E	&3296	–	&34F6	&34FE
	&3287	&328F	&3297	–	&34F7	&34FF
	&3500	&3508	&3510	–	&3770	&3778
	&3501	&3509	&3511	–	&3771	&3779
	&3502	&350A	&3512	–	&3772	&377A
ROW 2	&3503	&350B	&3513	–	&3773	&377B
	&3504	&350C	&3514	–	&3774	&377C
	&3505	&350D	&3515	–	&3775	&377D
	&3506	&350E	&3516	–	&3776	&377E
	&3507	&350F	&3517	–	&3777	&377F

Figure I

Part One

HOW TO WRITE MACHINE CODE GAMES

By KEVIN EDWARDS

8 bytes)=&3280. That's why the next location down from &3007 is &3280.

It's now time for the first of many programs.

Type in and run Program I. All it is designed to do is store the number 15 in each byte of the video RAM, starting from location &3000 (the top left corner) and ending at &7FFF – if you are prepared to wait that long.

To slow it down a bit I arranged that a key must be pressed before the next location will be changed.

You will notice that a wide yellow pixel appears on the screen each time you press a key – this may be difficult to see on a normal television set. In fact there are two pixels, side by side.

These can be individually addressed with any of the 16 colours available – in this example they are the same colour because the number 15 means display two yellow pixels – we'll see why in a minute. If the number had been different, other colours would appear.

The point is we now know that the colour of the two pixels can be changed by storing different numbers in the video RAM – the number must be in the range 0 to 255 – a byte.

Program II shows what happens when bytes 0 to 255 are stored consecutively in the video RAM – only the first 256 bytes of rows 0,1 and 2 are changed, for speed. You should see three identical coloured sections of rows across the screen.

Program III is identical to Program II, though this time machine code has been used to speed it up.

Here's a brief description of how Program III works:

Line number	
100	Loads the accumulator with the byte that will be stored in the video RAM.
110	Loads the X register with 0. This is used as an offset register.
120	Stores the byte held in the accumulator at location &3000+X, the start of row 0.
130	Stores the byte at location &3280+X, row 1.
140	Stores the byte at location &3500+X, row 2.
150	Increments the offset register by one.
160	Causes a branch if the X register is not 0. If X is zero, the loop is ended and the program returns to Basic because of the RTS in line 170.

Remember that the 6502 registers can only hold a number between 0 and 255. So when the X register contains 255 and an INX is executed, the X register will contain 0. This means that only the first 256 bytes on each line will be changed by the program – 0 to 255 inclusive.

To show how fast machine code is, type in and run Program IV and Run it. This puts the bytes 0 to 255 in all 20k of the video RAM. Press a key to

→

```
10 REM PROGRAM I
20 MODE 2
30 VDU23;8202;0;0;0;
40 byte=15
50 FOR location=&3000 TO &7FFF
60 ?location=byte
70 REPEAT UNTIL GET
80 NEXT
```

Program I

```
 10 REM PROGRAM II
 20 MODE 2
 30 byte=0
 40 REPEAT
 50 VDU31,0,6
 60 PRINT"Byte = ";byte
 70 FOR offset=0 TO &FF
 80 offset?&3000=byte
 90 offset?&3280=byte
100 offset?&3500=byte
110 NEXT
120 REPEAT UNTIL GET
130 byte=byte+1
140 UNTIL byte>255
```

Program II

```
 10 REM PROGRAM III
 20 MODE 2
 30 byte=0
 40 REPEAT
 50 VDU31,0,6
 60 PRINT"Byte = ";byte
 70 FOR pass=0 TO 2 STEP2
 80 P%=&C00
 90 [OPT pass
100 .Start LDA#byte
110 LDX#0
120 .next STA&3000,X
130 STA&3280,X
140 STA&3500,X
150 INX
160 BNE next
170 RTS
180 ]NEXT pass
190 CALL Start
200 REPEAT UNTIL GET
210 byte=byte+1
220 UNTIL byte>255
```

Program III

```
 10 REM PROGRAM IV
 20 MODE 2
 30 byte=0
 40 REPEAT
 50 FOR pass=0 TO 2 STEP2
 60 P%=&C00
 70 [OPT pass
 80 .Start LDA#byte
 90 LDX#0
100 .next STA&3000,X
110 INX
120 BNE next
130 INC next+2
140 BPL next
150 RTS
160 ]NEXT pass
170 CALL Start
180 VDU31,5,15
190 PRINT"Byte = ";byte
200 REPEAT UNTIL GET
210 byte=byte+1
220 UNTIL byte>255
```

Program IV

From Page 75

increment the value of the byte stored in screen memory.

Line number	
80	In Program IV loads the accumulator with the byte to be stored in the video RAM.
90	Loads the X register with 0 – this is used as an offset.
100	Stores the byte on the screen.
110	Increments the offset register.
120	Branches if the X register is not 0. The branch is not taken until the index register, X, has taken all of the values 0 to 255.
130	Increments the high byte of the screen address being changed.
140	Branches to the next 256 block if the address is still part of the video RAM. The screen ends at location &8000. The high byte of &8000 is negative, because bit 7 is set (&80=%10000000). That's why we only branch if the result is positive.

The RTS in line 150 returns to Basic.

What we must now do is find out the relationship between the byte stored in the video RAM and the colour of the two pixels displayed.

To explain this easily we must use binary numbers.

A nybble, for those who don't know, is a four bit number – sometimes known as as half a byte. A byte consists of two nybbles – the top nybble and the bottom nybble.

Each nybble has 16 different states (0-15, %0000 to %1111). This is very convenient for representing the 16 colours in Mode 2.

The logical way would be to use the top nybble (bits 4-7) of the byte being stored for the left pixel's colour, and the lower bybble (bits 0-3) for the right pixel's colour.

But this isn't the method used. Instead, we have to interweave the bits corresponding to the colours of the two pixels.

This is quite fun, but a pain in the neck when the previously explained method could have been used.

The reason for the interweaving is all to do with the hardware – it would be nice if they considered the people who have to write the software.

If we want to make the left pixel yellow and the right pixel red, we have to calculate the binary number for the colour of the left and right pixel – yellow is %0011 and red is %0001. Table I will help you convert colour numbers into binary.

Now we interweave the bits of the two colours to make up the byte that will be stored in the video RAM. We get four bits from the colour of each pixel to make up eight bits (a byte).

First of all we take the most significant bit (the left-most bit) from the left pixel's colour – 0 in the case of yellow. This will be bit 7 of the byte we are creating.

Now we take the most significant bit from the right pixel's colour – 0 in the case of red. This is bit 6 of the new byte.

We now repeat this procedure for the remaining 6 bits – 3 bits from each colour. Remember to take the first bit from the left colour and the next bit from the right colour.

If this is done correctly you will finish up with the binary number %00001011

0	%0000	Black
1	%0001	Red
2	%0010	Green
3	%0011	Yellow
4	%0100	Blue
5	%0101	Magenta
6	%0110	Cyan
7	%0111	White
8	%1000	Black/White
9	%1001	Red/Cyan
10	%1010	Green/Magenta
11	%1011	Yellow/Blue
12	%1100	Blue/Yellow
13	%1101	Magenta/Green
14	%1110	Cyan/Red
15	%1111	White/Black

Table I: Colour number and binary equivalent

left	right	colour
0	0	Black
2	1	Red
8	4	Green
10	5	Yellow
32	16	Blue
34	17	Magenta
40	20	Cyan
42	21	White
128	64	Black/White
130	65	Red/Cyan
136	68	Green/Magenta
138	69	Yellow/Blue
160	80	Blue/Yellow
162	81	Magenta/Green
168	84	Cyan/Red
170	85	White/Black

Table II: Ready-reference guide for pixel colours

(11 in decimal, &B in hex).

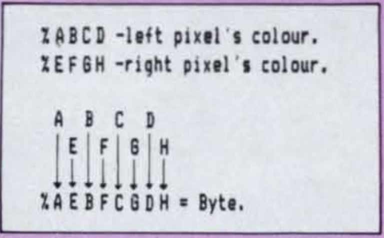
Figure II should help clear the mist – take a look.

If you change the variable *byte* to 11, in Program I, you'll see that the left pixel will be yellow and the right pixel will be red. Hooray! It worked.

To illustrate this further, I've written a program to calculate the byte to be stored given the colour of the left and right pixels.

To ease the confusion, all numbers are displayed in binary. This helps to show how the bits have been interwoven.

Type in Program V and try it. It's all in Basic so I'll leave it up to you to find out how it works.



%ABCD -left pixel's colour.
%EFGH -right pixel's colour.

Figure II: Interweaving pixels

Program VI is the same as Program V but colour blocks now replace the binary numbers.

Table II is a ready-reference guide to pixel colour combinations. For example, to calculate the byte required to produce a yellow pixel on the left and a blue pixel on the right you add up the numbers 10 and 16, resulting in 26. It's as easy as that.

So far we've concentrated on how the screen is mapped, and how each pixel can be set in any colour. This is vital knowledge whatever you're doing.

You see, graphics are all to do with making shapes on the screen by changing the contents of the video RAM – it's just the same if you want to display a space invader or the letter Z.

Most of this month's programs are in Basic. This may seem a bit weird when the article is all about machine code games but it is easier to explain things initially in Basic.

Don't worry, next month's article jumps deeper into the world of machine code, so swot up your 6502 as soon as possible.

See you next month.

```
   10 REM PROGRAM V
   20 REM By Kevin Edwards
   30 MODE 7
   40 no=FALSE:yes=TRUE
   50 want_space=no
   60 REPEAT
   70 INPUT'''"Enter colour for left
pixel (0-15)",left
   80 UNTIL left>=0 AND left<16
   90 PRINT''left;" = %";
  100 PROCbinary(left)
  110 left_nibble$=nibble$
  120 REPEAT
  130 INPUT'''"Enter colour for right
 pixel (0-15)",right
  140 UNTIL right>=0 AND right<16
  150 PRINT''right;" = %";
  160 PROCbinary(right)
  170 right_nibble$=nibble$
  180 PRINT''TAB(10);
  190 want_space=yes
  200 PROCbinary(left)
  210 PRINT'TAB(11);
  220 PROCbinary(right)
  230 PRINT'TAB(11);"---------"
  240 PRINTTAB(10);"%";
  250 byte$=""
  260 FOR bit=1 TO 4
  270 byte$=byte$+CHR$(ASC(MID$(left_
nibble$,bit,1)))
  280 byte$=byte$+CHR$(ASC(MID$(right
_nibble$,bit,1)))
  290 NEXT
  300 PRINT;byte$
  310 PRINTTAB(11);"---------"
  320 byte=0
  330 FOR bit=8 TO 1 STEP -1
  340 IF ASC(MID$(byte$,bit,1))=ASC"1
" THEN byte=byte+(2^(8-bit))
  350 NEXT
  360 PRINT''TAB(7);"Byte = ";byte;"
or &";~byte
  370 END
  380 DEFPROCbinary(nibble)
  390 nibble$=""
  400 FOR bit=3 TO 0 STEP -1
  410 IF want_space VDU ASC" "
  420 IF nibble AND (2^bit) VDU ASC"1
":bit$="1" ELSE VDU ASC"0":bit$="0"
  430 nibble$=nibble$+bit$
  440 NEXT
  450 ENDPROC
```

Program V

```
   10 REM PROGRAM VI
   20 REM By Kevin Edwards
   30 @%=8
   40 VDU23,224,255,255,255,255,255,2
55,255,255
   50 DIM pattern(1,15)
   60 FOR left_right=0 TO 1
   70 FOR colour=0 TO 15
   80 READ pattern(left_right,colour)
   90 NEXT
  100 NEXT
  110 MODE 2
  120 FOR loop=0 TO 15
  130 COLOUR loop
  140 VDU 224,32
  150 COLOUR 7
  160 PRINT;loop,;
  170 NEXT
  180 INPUT''"Left  ...",Left
  190 IF Left<0 OR Left>15 VDU7:GOTO
180
  200 INPUT''"Right ...",Right
  210 IF Right<0 OR Right>15 VDU7:GOT
O 200
  220 PRINT''
  230 COLOUR Left
  240 VDU 224
  250 COLOUR Right
  260 VDU 224
  270 COLOUR 7
  280 PRINT;" = ";
  290 Byte=pattern(0,Left)+pattern(1,
Right)
  300 PRINT;Byte;" or &";~Byte
  310 *FX15
  320 PRINT''"Press SPACE to cont"
  330 REPEAT UNTIL GET=32
  340 GOTO 110
  350 REM Data for left-hand pixel
  360 DATA0,2,8,10,32,34,40,42,128,13
0,136,138,160,162,168,170
  370 REM Data for right-hand pixel
  380 DATA0,1,4,5,16,17,20,21,64,65,6
8,69,80,81,84,85
```

Program VI

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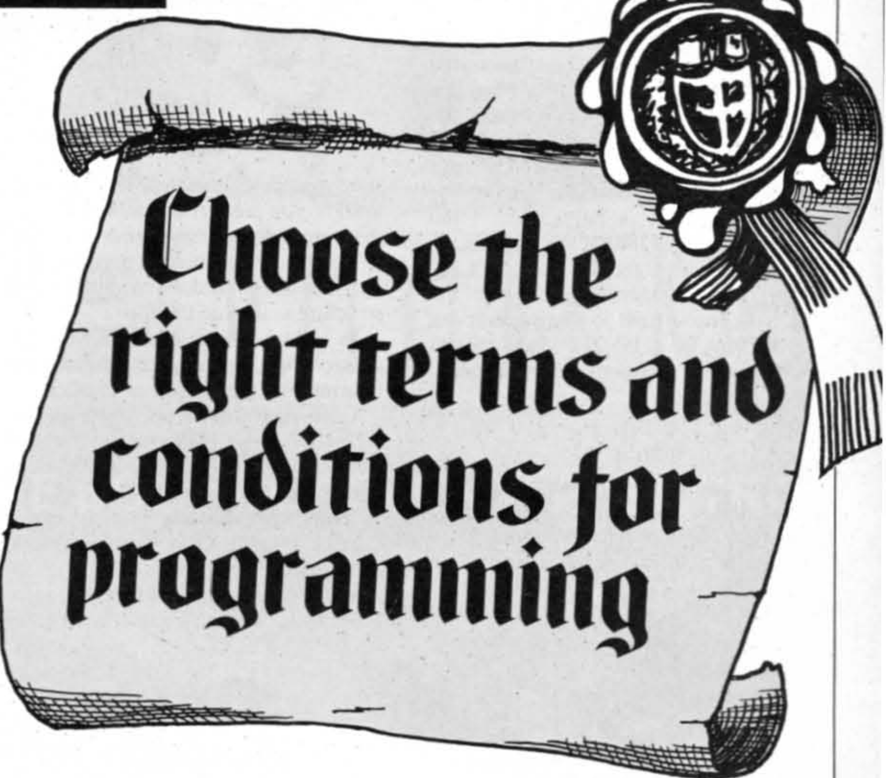

Choose the right terms and conditions for programming

AS promised last month, we're going to have another look at subscripted variables. Before we do though, we're going to examine a subject we've so far neglected – conditional statements.

A conditional statement is an IF . . . THEN statement. It means:

If A is true THEN do B

whatever A and B are. If, on the other hand, A isn't true, you won't do B. You do B on condition A – that's why we call them conditional statements.

In fact it's just like normal English usage – IF it's so an so, THEN I'll do so and so.

```
10 REM PROGRAM I
20 get$ = GET$
30 IF get$ = "A" THEN PRINT CHR$(7)
```

Program I

Look at Program I. All that happens is we wait for a key press – line 20. Line 30 is a conditional statement:

```
30 IF get$ = "A" THEN PRINT CHR$(7)
```

This means that, if we pressed A we PRINT CHR$(7) which causes a beep.

If the key we pressed were other than A, the program would simply end – because we haven't met the condition for a beep.

This way of testing input with an IF statement is very important in computer programming as we shall see. It allows the program to take different directions depending on the input from the user.

We've all experienced this sort of thing with games programs. For instance, Space Invaders has a routine something like:

IF key pressed is A THEN move laser left

IF key pressed is B THEN move laser right

Program I may not do all that much, but it does have two different outcomes depending on the key pressed – it can beep or refrain from beeping.

However, even such a simple program can be made user-friendly as the jargon has it. In the trade this is rather less kindly known as idiot proofing programs.

At the moment we must press A to get our beep. However the user might not have his Caps Lock on, and when he presses the key marked A, intending to get a beep, he doesn't – because he's inputting a lower case a, and we haven't tested for this in our condition.

```
10 REM PROGRAM II
20 get$ = GET$
30 IF get$ = "A" OR get$ = "a" THEN
PRINT CHR$(7)
```

Program II

Program II solves this, giving us a beep for both upper and lower case A. It does this on line 30. It's the OR that does the trick – allowing us to test for two conditions at once.

Line 30 reads IF A is pressed OR if a is pressed THEN beep. So we have two ways or conditions for beeping: IF A is pressed OR a is pressed.

To put it more formally, the OR statement works like this: If either condition one or condition two is true then do whatever's specified.

Really, it just works the way you read it, and I'm sure it's not going to give you any problems.

```
10 REM PROGRAM III
20 get$ = GET$
30 IF get$ = "A" OR get$ = "a" THEN
PRINT CHR$(7) ELSE GOTO 20
```

Program III

Program III again beeps on A or a being pressed. However it does more than this – it keeps on GETting a key until you do press one of our beeping pair. Let's see how it does this.

```
30 IF get$ = "A" OR get$ = "a" THEN
PRINT CHR$(7) ELSE GOTO 20
```

The first part of line 30 works exactly as before, beeping if A or a is pressed.

Tagged on the end, however, is an ELSE. Again this works in much the way you'd expect from normal English. If your conditions are met – that is, true – THEN you do whatever's specified, or ELSE – if they're not true – you do the alternative given.

Before the micro never had an alternative – if you didn't press A or a to get a beep, the micro just carried on – and ENDed since there wasn't another line in our examples.

In this version of line 30 we've given the micro an alternative to do if neither A nor a are pressed – we've told it to GOTO line 20.

So, if we're running the program and press a G, line 30 examines it, and realises it isn't an A or a so it doesn't do the task specified after THEN, that is, beep. Instead it does the alternative task specified after the ELSE and goes to 20, to await yet another input.

Finally, when you enter A or a, the

→

From Page 79

condition for the THEN is met so the program beeps. As before, the micro then drops through to the next line which, being non-existent, causes the program to end.

Notice that in this case the ELSE isn't done. That is, we don't go back to line 20. The ELSE is only done if the conditions after the IF are not met.

To help you get the feel of ELSE, think of it as *otherwise*.

Now, we're used to using conditions in REPEAT . . . UNTIL loops, though we've never really stressed the point. For example:

```
REPEAT
UNTIL FALSE
```

keeps repeating until the condition FALSE is met. Since there isn't anything specified that could possibly be made FALSE, the thing keeps on repeating indefinitely . . .

However, we have used REPEAT . . . UNTIL with more definite conditions in such ways as:

```
REPEAT
counter% = counter% + 1
UNTIL counter% = 100
```

We could replace the REPEAT . . . UNTIL with an IF and a GOTO. For example:

```
10 counter% = 0
20 counter% = counter% + 1
30 IF counter% <> 100 THEN GOTO 20
```

These loops are know as conditional loops.

The <>, by the way, means "not equal to". Table I shows the full list of such inequalities, as they are known.

Now conditional loops with GOTOs are hard to follow – as a rule use REPEAT . . . UNTILs in preference.

For instance Program III converted to use a REPEAT . . . UNTIL looks like Program IV.

```
10 REM PROGRAM IV
20 REPEAT
30 get$ = GET$
40 UNTIL get$ = "A" OR get$ = "a"
50 VDU 7
```

Program IV

As you can see from line 40, you can use OR with UNTIL to allow more than one condition to be tested for.

The VDU 7, in line 50, is directly equivalent to PRINT CHR$(7). If you don't believe me, try VDU 65, and you'll see you get the same print out as PRINT CHR$(65).

The logic flow of the program is quite simple: it keeps repeatedly "getting" UNTIL you press A OR a. It then drops through the loop and beeps.

Symbol	Meaning
=	equal to
<>	not equal to
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

Table I: Inequalities' symbols

Now these techniques play a major part in one standard programming structure – that of the menu.

In a menu, you allow the user to control how the program operates by offering him a selection of choices.

For instance, in a word processor you might ask if he wishes to save what's written, load a new program, print it out and so on.

Instead of having him type out PRINT THE TEXT or whatever, which is liable to be full of mistyping and is a devil for the micro to interpret, we force his hand by assigning a number or letter to each choice.

For example, the user of the word processor might see displayed on the screen.

```
A. Print the text
B. Save this text
C. Load some more text
PRESS A, B OR C
```

Here all three options are given but only A,B or C has to be pressed to make a choice.

```
   10 REM PROGRAM V
   20 PRINT "You can :-"
   30 PRINT "A. Beep"
   40 PRINT "B. Clear the screen"
   50 PRINT "C. Do neither"
   60 REPEAT
   70 get$ = GET$
   80 UNTIL get$ = "A" OR get$ = "B"
OR get$ = "C"
   90 IF get$ ="A" THEN VDU 7
  100 IF get$ ="B" THEN CLS
```

Program V

Program V shows a this sort of menu in operation. It's highly unlikely you'd be offered something like this in practice, but it illustrates the ideas.

Notice:

- We present each selection beside a "key".
- We then repeatedly check the keys pressed until one corresponds with one of the legitimate "keys".
- We then act on that "key".

We've forced the user's hand into giving us one of the options shown. Dictating things this way makes a program far easier to use from the user's point of view and much simpler to program – since you don't have to cater for "creative" inputs.

We often carry on with this throughout a whole program, all the options being presented as menus. Such a program is known as menu-driven.

Have a closer look at line 80:

```
80 UNTIL get$ = "A" OR get$ = "B" OR
get$ = "C"
```

Here we've strung three conditions together with OR. Notice that we can't abbreviate this to:

```
80 UNTIL get$ = "A" OR "B" OR "C"
```

Although you can get away with the above in normal English, in Basic you need to be far more formal repeating the "get$=" part for each condition.

Lines 90,100 then sort out the various options.

By the way, although I've assumed it I've never stated formally that THEN can be followed by any normal statement. For example:

```
IF...THEN PRINT "xxxxxx"
IF...THEN GOTO 1270
IF...THEN PROCprocedure
```

and so on.

Notice also the polite "Do neither" option. It's vital to have some sort of escape route in every menu you present, so the user can get out if he's accidentally got to the wrong menu.

All those:

```
IF get$ = "A" OR get$ = "B" OR
get$ = "C"
```

are a bit offputting aren't they? And you can guarantee anything that looks as complicated as this is bound to be hard to follow when it appears as line 1234 of an 8000 line program.

There is an easier way to see if A OR B OR C has been pressed. Look at Program VI.

```
10 REM PROGRAM VI
20 REPEAT
30 get$ = GET$
40 UNTIL INSTR( "ABC", get$ )
```

Program VI

Line 40 does the work:

```
40 UNTIL INSTR("ABC", get$)
```

We use INSTR to tell if one string

occurs in another string – INSTR stands for IN STRing.

In line 40 we're using it to tell us if the character stored in get$ is in the string "ABC". The idea is we keep on repeating until it is.

We're not going to go into INSTR fully here. Suffice it to say that inside the brackets, you give INSTR two strings separated by a comma. It then searches the first string for occurrences of the second.

If it doesn't find any, then INSTR is false; if it does find something then INSTR is true – not surprisingly as then the second string is IN the first STRING.

That's what we're using in line 40. The thing keeps repeating until INSTR("ABC", get$) is true – that is, the character we've pressed is either A OR B OR C.

We can shorten things even more by putting the GET$ actually inside INSTR. Program VII shows the idea.

```
10 REM PROGRAM VII
20 REPEAT
30 UNTIL INSTR( "ABC", GET$ )
```

Program VII

Once it starts to do the INSTR of line 30 it meets the GET$ and waits for a key to be pressed. As soon as one is pressed, it then continues with INSTR, checking to see if this character is indeed in the string to be searched.

This way we've eliminated the:

```
get$ = GET$
```

from Program VI.

Actually I don't like doing things like this, because it's not immediately clear what's going on.

More importantly you may know that A OR B OR C has been pressed since you've dropped out of the loop, but as the key you pressed isn't stored in any variable, you can't test it with IF statements to find out which one it was and take appropriate action.

And now for something completely different . . .

Do you remember last month how I challenged you to use nested loops to read data into subscripted variables as well as print them out?

Well, Program VIII does just this. It's the bare framework of a reading program I wrote for my daughter.

Before you all write in, I know it needs a lot doing to it before it's educationally worthwhile – it's just an example.

If you look at the data statements, lines 170-210, you'll see a pattern: each row has two words with "u" in them and one ending with "at". I think you can guess what Katie is doing at school.

```
10 REM PROGRAM VIII
20 MODE 6
30 DIM word$(5,3)
40 REM *** INPUT  DATA ***
50 FOR row%=1 TO 5
60 FOR column%=1 TO 3
70 READ word$( row%, column%)
80 NEXT column%
90 NEXT row%
100 REM *** OUTPUT DATA ***
110 FOR row% = 1 TO 5
120 FOR column% = 1 TO 3
130 PRINT word$( row%, column%),;
140 NEXT column%
150 PRINT
160 NEXT row%
170 DATA but,bun,bat
180 DATA cut,cat,cub
190 DATA sun,sub,sat
200 DATA hut,hat,hug
210 DATA rat,run,rub
```

Program VIII

Program VIII simply reads the data in with nested loops, lines 50,90, and then prints them out, lines 110,160.

Katie likes to trace the path the "at" words make when the grid's on the screen. (The basis for a better program there.)

Then again, sometimes we take the words one row at a time, picking a row at random, and look for patterns, and so on.

Program IX formalises this. It is using a sledgehammer to crack a walnut but it does illustrate some useful techniques.

As usual we choose Mode 6, turn the cursor off – line 30 – then DIM the matrix for our words – line 40. Since we have five rows with three words in each, I use *DIM word$(5,3)*.

Actually, I'm being a bit wasteful here. When you DIM you get the zero indices thrown in for free, for example *word$(0,0)* exists. So we could get away with *DIM word$(4,2)*, with the three rows 0,1,2 and so on. In practice I leave these zero subscripts for special cases.

PROCinput – line 50 – then reads the

→

```
   10 REM PROGRAM IX
   20 MODE 6
   30 VDU 23;8202;0;0;0;
   40 DIM word$(5,3)
   50 PROCinput
   60 REPEAT
   70 CLS
   80 PRINT TAB(8,10) "You can
display:-"'
   90 PRINT TAB(8) "1. A random row"
  100 PRINT TAB(8) "2. The whole
matrix"
  110 PRINT TAB(8) "3. End the
program"
  120 REPEAT
  130 choice$=GET$
  140 UNTIL INSTR("123", choice$)
  150 IF choice$ ="1" THEN
PROCrandom_row
  160 IF choice$ ="2" THEN
PROCdisplay_all
  170 IF choice$ ="3" THEN END
  180 UNTIL FALSE
  190 DEF PROCinput
  200 FOR row%=1 TO 5
  210 FOR column%=1 TO 3
  220 READ word$( row%, column%)
  230 NEXT column%
  240 NEXT row%
  250 ENDPROC
  260 DEF PROCdisplay_all
  270 CLS
  280 PRINT'''
  290 FOR row% = 1 TO 5
  300 FOR column% = 1 TO 3
  310 PRINT word$( row%, column%),;
  320 NEXT column%
  330 PRINT
  340 NEXT row%
  350 PRINT TAB(10,23) "Any key to
continue"
  360 dummy$ = GET$
  370 ENDPROC
  380 DEF PROCrandom_row
  390 REPEAT
  400 CLS
  410 row% = RND(5)
  420 PRINT TAB(0,12);
  430 FOR column% = 1 TO 3
  440 PRINT word$(row%, column%),;
  450 NEXT column%
  460 PRINT TAB(8,23)" S to Stop.
Other keys give new row "
  470 dummy$=GET$
  480 UNTIL INSTR("Ss", dummy$)
  490 ENDPROC
  500 DATA but,bun,bat
  510 DATA cut,cat,cub
  520 DATA sun,sub,sat
  530 DATA hut,hat,hug
  540 DATA rat,run,rub
```

Program IX

From Page 81

> *Working out what other people's programs do is one of the quickest ways of making progress*

data into the matrix, exactly as in Program VIII.

The main program loop – lines 60, 180 – presents a menu with three choices – lines 80, 110 – then waits for your response – lines 120,140.

Depending on this response, you either go to PROCrandom_row, PROCdisplay_all or END. Note – your main menu should always allow someone to quit the program.

PROCdisplay_all is a direct lift from Program VIII – it just prints out all the data in table form – lines 290,340. Afterwards it waits for a key to be pressed – lines 350,360 – before ending the procedure and returning to the main menu.

PROCrandom_row, as its name suggests, picks a row of data at random and prints it.

It does this by picking a random value for *row%* – line 410 – and then printing out *word$(row%, column%)* for *column%* equal 1 to 3 – lines 430,450.

This whole thing is inside a REPEAT . . . UNTIL loop – lines 390,480.

After the row has been printed, the micro tells you it's expecting a response – line 460 – S to stop, any other key to continue. We then GET the response – line 470.

If it's S or s we drop out of the loop and end the procedure – lines 480,490 – returning once more to the main menu.

Notice how we picked out all the values in a row by fixing *row%* then printing out *word$(row%, column%)* for all the values of *column%*.

We could just as easily have picked out a single column by fixing *column%* then printing out *word$(row%, column%)* for all the values of *row%*.

That's one of the nice things about two-dimensional arrays – you can get at the information easily in so many different ways.

Program X illustrates this. It's by far the longest program we've looked at in this series. It uses all the techniques we've discussed so far to let us examine the marks of Tom, Dick and Harry in the subjects Maths, English, French and Physics.

Again, I'm not suggesting that a specially written program is the ideal way of handling such a simple set of data – pencil and paper is often better.

However Program X does illustrate the power and versatility of subscripted variables. And you'll gain a fair bit by examining the programming style and techniques.

Working out Program X is by far the most challenging thing I've asked you to do in this series. Persevere though, it isn't as hard as it looks.

And you're at the stage now where working out what other people's programs do – and turning up your nose at their programming style – is one of the quickest ways for you to make progress.

So have a go at Program X.

Next month we'll have a look at tricks with strings – my favourite part of Basic.

```
   10 REM PROGRAM X
   20 MODE 6
   30 VDU 23;8202;0;0;0;
   40 PROCinit
   50 REPEAT
   60 CLS
   70 PRINT TAB( 0, 10) "You can
choose marks:-"'
   80 PRINT TAB(4) "1. By subject"
   90 PRINT TAB(4) "2. By student"
  100 PRINT TAB(4) "3. In full"
  110 PRINT TAB(4) "4. Or end program
"
  120 REPEAT
  130 choice$ = GET$
  140 UNTIL INSTR( "1234", choice$ )
  150 IF choice$ = "4" THEN END
  160 IF choice$ = "3" THEN
PROCall_marks
  170 IF choice$ = "2" THEN
PROCby_student
  180 IF choice$ = "1" THEN
PROCby_subject
  190 UNTIL FALSE
  200 REM ==========================
  210 DEF PROCinit
  220 name% = 3 : subject% = 4
  230 DIM name$( name% ), subject$(
subject% )
  240 DIM mark%(3,4)
  250 @% = 5
  260 FOR loop%=1 TO name%
  270 READ name$(loop%)
  280 NEXT loop%
  290 FOR loop%=1 TO subject%
  300 READ subject$(loop%)
  310 NEXT loop%
  320 FOR row% = 1 TO name%
  330 FOR column% = 1 TO 4
  340 READ mark%( row%, column% )
  350 NEXT column%
  360 NEXT row%
  370 ENDPROC
  380 REM ==========================
  390 DEF PROCall_marks
  400 CLS
  410 FOR column% = 1 TO subject%
  420 PRINT TAB( column% * 8, 8)
subject$(column%);
  430 NEXT column%
  440 FOR row% = 1 TO name%
  450 PRINT' name$(row%);
  460 FOR column%=1 TO subject%
  470 PRINT TAB(column% * 8) mark%(
row%, column%);
  480 NEXT column%
  490 NEXT row%
  500 PRINT TAB(8,23) "Press any key
```

Turn to Page 150

Program X

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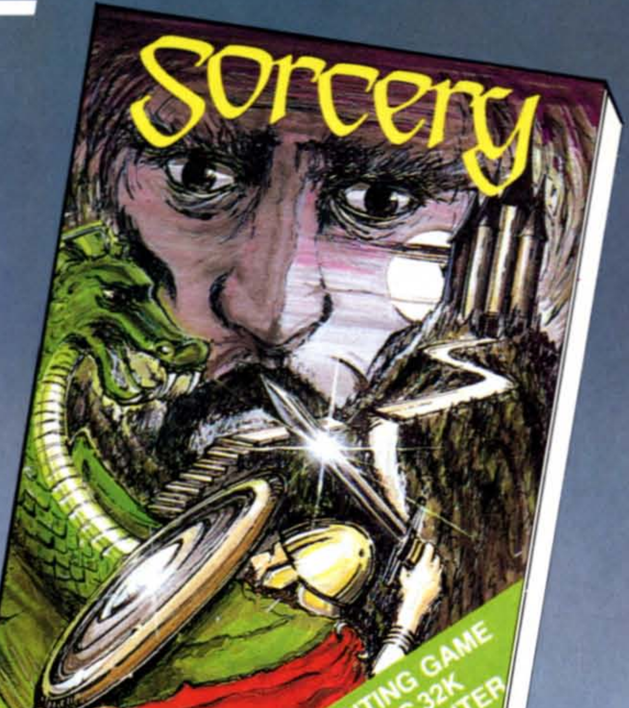
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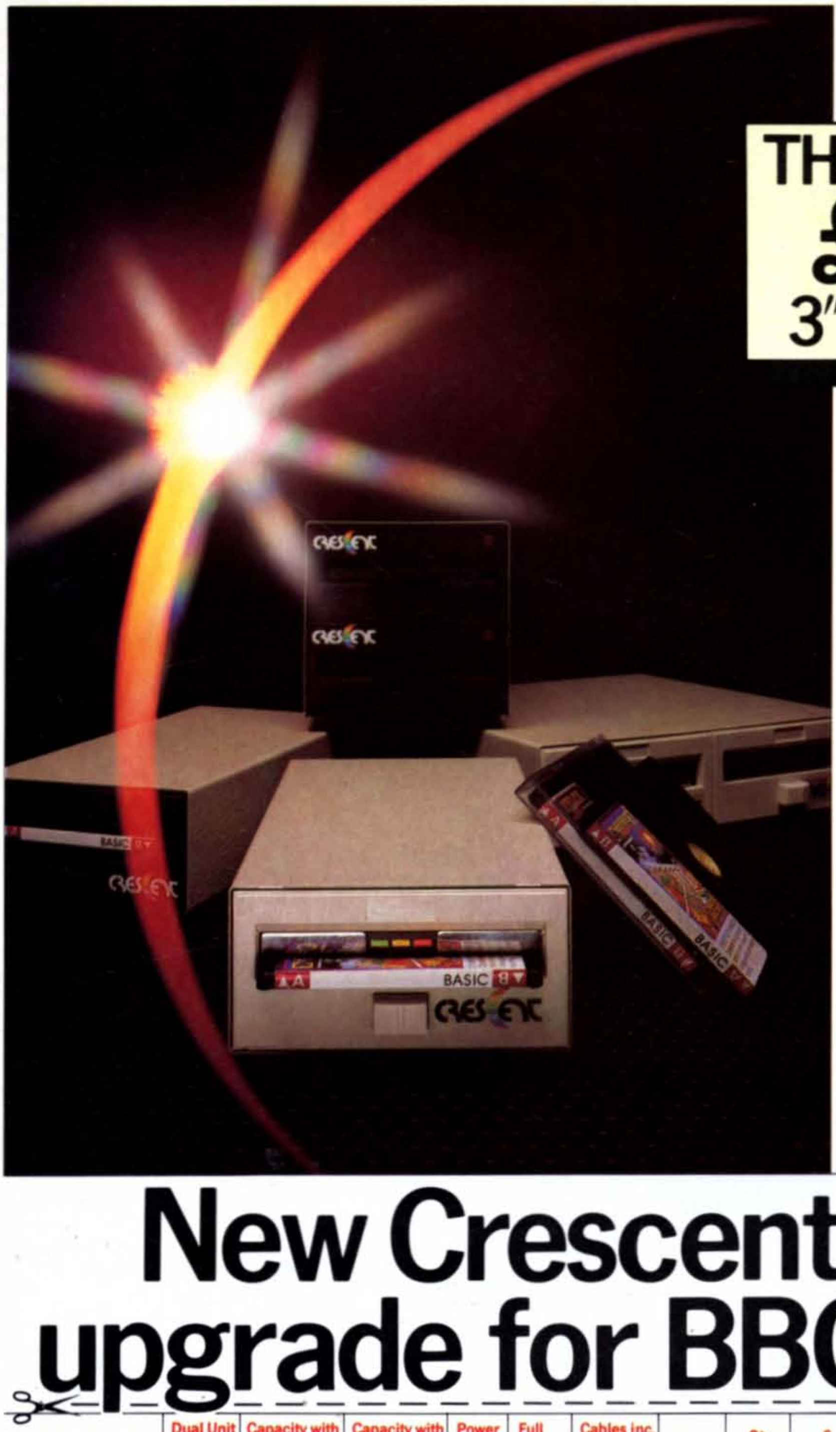

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MIKE COOK'S PROBLEM PAGE

Subtitles a question of synchronisation

I WANT to play a video film I have bought. As I play it I want to add subtitles at the bottom on a piece of blank screen, then re-record the whole thing so that we have a video copy of film plus subtitles.

Can the BBC Micro be used to do the job of writing words at the bottom of the screen at the same time as a video is playing. *K. McBridge, Nutfield Primary School, Redhill, Surrey.*

● **The problem is one of syncronisation. You have to make the TV picture produced by the micro exactly match that produced by the video recorder.**

Unfortunately this is not very easy to do. It involves a circuit that looks at the incoming video and adjusts the speed of the micro's video to match.

When a match in speed is achieved the two signals must then be allowed to slip until they are exactly in phase.

I only know of one company who produce a unit to do this – Video Electronics, Wigan Road, Atherton M29 0RH (Tel: 0942-882332.

However, the Gen lock unit, as it is called, will cost you about the same as your micro.

Safety ... and wavey lines

AS the Government department with responsibility for the safety of electrical equipment for use in the home, our attention has been drawn to a recent reply to a letter featured in Mike Cook's Problem Page in the December issue of *The Micro User*.

In Mr Cook's reply, he suggested that in order to reduce the "wavey lines" from a VDU display the user should experiment by disconnecting the earth connection of the micro or the TV set. We consider this advice to be extremely dangerous.

If a reader were to be killed or injured as a result of heeding this advice both Mr Cook and your publishers could become subject to extensive claims for compensation.

We are sure that you will agree that advice which could put your readers at risk should not be given. – *Robert Faull, Department of Trade and Industry, Consumer Safety Unit, London.*

● **Mr Faull is quite correct in what he says. It is conceivable that a fault could develop which might be potentially dangerous if there were NO earth connected to a system.**

In fact, in my reply I did say: *"I only recommend ONE earth disconnected and the equipment will still have protection IF it is all connected up".*

Although the signal earths are not specified for current rating they will carry sufficient to blow a fuse.

It is common practice with some electrical engineers to remove the cables from test equipment and soldering irons to make them safer.

However, as a general policy it is not recommended to remove ALL earths from a system, and this, of course, is not what I suggested.

As a general rule, what I suggest in my articles is done at the reader's own risk – after all I do it at my own risk, too.

Remember, the safest piece of electrical equipment is never plugged in.

A Hong Kong novice asks . . .

I'VE been a subscriber to *The Micro User* since issue number one, although not yet an owner of a Beeb, neither do I have access to one, as customs regulations made it impossible to import one where I lived.

Now that I am in Hong Kong, things are easier ... but very expensive, and without reason! A Model 'B' with disc interface fitted, advertised at £409 by Akhter Instruments in the UK, costs £600 here. Strange, when you consider that it's made here.

There are several questions that I would appreciate you answering as I feel they would be of benefit to other novices:

Why can't the microprocessor in a micro of a different make be used as a second processor to run software on a BBC?

After all, shortly, Apple-clones with a Z80 capability and a cheapish disc-drive (or the Cyborg that promises wonders), will be available at almost the price of the Z80 second processor alone, and with availability of lots of software.

With a 6502 or Z80 second processor costing nearly £400 one can expect the 16 bit add-on at £700, and only shudder at the 32 bit add-on's price.

Why not buy a Sinclair QL as a second micro instead, and if anyone can link-up the two, well . . .

Is it not possible, and more sensible to have an add-on sideways ROM board boxed in one of those second processor type boxes, with a hinged lid, perhaps, and a long lead terminating in the necessary configuration that plugs into the BBC just once.

No more opening, each time you buy a ROM, no more heating up. In fact, we'll soon need more than 16 sockets. So why not a box that takes more than one such board? One can physically switch in the board one needs, making a new set of 16 ROMs (or 13) available?

The leads can go in/out of the Econet socket as not many home users need that.

With everyone specifying the right-most socket for their ROM, who do we listen to?

The Apple supports a card called the Mountain RAM Talk Card, available here for around £12.

Plug it in and you have speech synthesis.

I've tried all sorts of complicated English sentences and

→

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .

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102f ACCOUNT £29.95 B D
THIRD CHOICE This version of the above program uses random access disc files and can hold up to 1100 entries on 100K discs, and up to 2250 on 200K discs. Included is a choice of CASH/BANK or VAT/BANK headings. Over 830000 possible accounts combinations. Ledger sheets and summaries can be printed as well as full accounts. The latest balance is available at any time. This program is only available on disc MODE 7

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IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 159.

From Page 87

even Chinese names – it's reasonably good.

So why can't us Beebers have an equivalent, without having to type numbers and funny phonemes as our only route?

Finally, a request for advice: I need 80-column workability and a colour monitor. Does the Taxan RGB Vision-3 qualify?

On the Vision-1 and Vision-ex I couldn't read "M" and "W" clearly.

How about a set of colour photos of a graphic display and an 80 column "Wordwise" display on several monitors in a row, for comparison?

You're a really great magazine. I enjoy every page. Keep it up and good luck – *Zaheer A. Kidray, Hong Kong.*

● A micro can only be used as a second processor if its software expects it to be used in this way and there is hardware provision for transferring data from one machine to another. Therefore you cannot use just any micro.

The second processor cards on the Apple micro switch off the first processor and "take over" the micro's bus. The Acorn second processors run at the same time as the first processor, sharing the work and so achieving faster processing times.

As to your suggestion of using a Sinclair QL – personally, I would not have one given to me. If you did link them up – which is perfectly feasable – they could not communicate sensibly without extensive software on both sides.

It's rather like buying a small car, and then complaining that nobody will fit a formula one engine in it.

The overheating associated with add-on boards comes in part from the extra strain placed on the power supply. Some external boards with their own power supply are already appearing on the market.

The only thing stopping you typing in your own phonemes instead of numbers is the software – do you want to write it?

This will only apply to the phoneme type speech synthesisers and not to the official Acorn type.

As to an 80-column colour monitor, it is a matter of personal choice as to what you think is good enough, but they are not cheap and the type offered for sale by most computer retailers will, I suspect not be good enough for you.

However, Microvitec do a high resolution long persistence tube for their monitor but it pushes the price up to over £600.

We have found that photographs of TV screens do not convey the feeling of seeing it "live". I would recommend you see any monitor in action before you purchase it.

Quoting Mike Cook

I AM writing a book on mathematics for secondary school use, and plan to include the paragraph below.

I do not think there is any infringement of your copyright, as equations 11 and 12 are obtainable by standard mathematical procedures.

However I thought it wise to send you this in case there is anything you would object to in the above.

In The Micro User, number five, Mike Cook gives a program for designing vases, bowls and similar objects.

It uses an ingenious system by which you keep changing a curve until it pleases you.

This curve then spins around OC, and various points (X, Y, Z) are found on the surface so created.

The vase or bowl, of course, has a level, flat top, so method II with a tilted plane is needed.

Mr Cook uses different symbols; in our notation he makes his drawing by taking:

$x^* = 0.707107X+0.707107Y \ldots (11)$

$z^* = -0.408248X+0.408248Y+0.816597Z \ldots (12)$

Question four: Mike Cook does not say how he arrived at the numbers in equations (11) and (12). How would you guess he did this? – *W.W. Sawyer, Cambridge.*

● Yes I have no objection to you using this. As a matter of interest, the true answer to Question four is that he looked them up in the book Mathematical Elements for Computer Graphics. by D.F. Rodgers.

B interface

I OWN a BBC Model B and am trying to interface it to my RTTY/CW terminal.

I'm sorry to have to ask but I don't know anyone who could help and since I'm disabled I cannot get out to find out. – *D. Ferguson, Dover, Kent.*

● Connect the strobe up to CB2 on the user port and the lines D1 to D8 to the lines DB0 to DB7 on the user port.

Then run this program and you can drive your device from the BBC Micro's keyboard.

```
   10 ?&FE62=&FF
   20 ?&FE6C=(?&FE6C AND &F
) OR &E0
   30 REPEAT
   40 A%=GET
   50 ?&FE60=A%
   60 ?&FE6C=(?&FE6C AND &F
) OR &C0
   70 ?&FE6C=(?&FE6C AND &F
) OR &E0
   80 UNTIL FALSE
```

Ghosting and getting the method right

IS there anything I can do to reduce ghosting on my picture? I have a BBC Model B and I use a Sony TV. I don't think the television is at fault because it does not display ghosting with TV signals.

Could you also help me on two problems of actual program method?

How should I go about writing a routine to interpret Basic commands held in strings, either having been input or received from the RS423 port?

In the second case I would want to send commands from a central BBC to control several other micros simultaneously, in such a way that the program on the master micro could just transmit the Basic command – for example, PROC SEND ("MODE7").

My final question concerns graphics. I know how to write a procedure to convert X, Y, Z coordinates into the normal 2-D representation of space – with the y-axis diagonally across the page and using no perspective.

What I would appreciate is a PROC that will account for perspective – making things diverge to a middle horizon if they are further away.

Thank you for a GREAT magazine. – *C.P. Rybak, Maidenhead, Berkshire.*

● Transformation from 3D coordinates to a 2D projection is a little involved to explain in a short space but basically you must multiply them by a transformation matrix.

This was shown in the lines 1020 to 1050 in my "Cup" program on Page 44 of the July 1983 issue of *The Micro User*.

For a full explanation of what is involved, I would recommend the book Advanced Graphics with the BBC Micro by I.O. Angell and B.J. Jones.

Perspective is explained in some detail – for the more mathematically minded readers you might like to look at Mathematical Elements for Computer Graphics by D.F. Rogers mentioned above.

This however, assumes you know a matrix when you see one and is not computer specific.

In principle, to be able to interpret strings as you want you will have to pass them to the Basic command line interpreter in much the same way as you can use the Operating System command line interpreter.

Unfortunately this is something Acorn have not released and any hope of finding it out quickly might have been squashed by their legal action over Jeremy Rushton's book on the Basic interpreter.

Finally, the ghosting could be caused by too much injection of colour sub carrier signal for your set. You could try reducing this as suggested in Micro Mail in the March 1984 issue.

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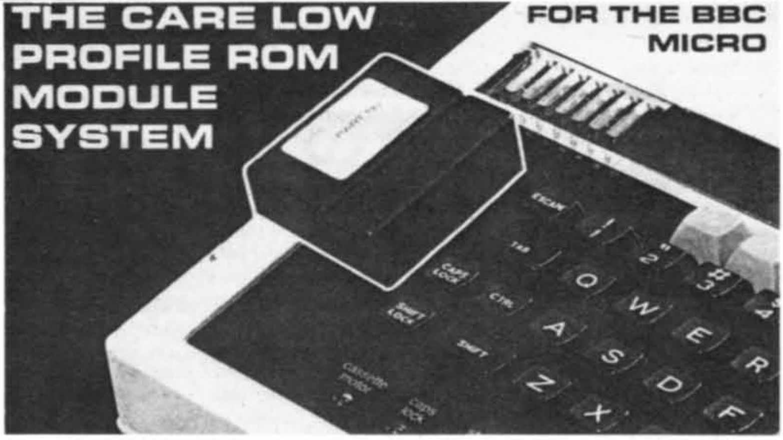

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TALKER

TALKER is a versatile utility to enable you to construct sentences of up to 30 words quickly and easily from the words provided by the Acorn speech chip's Phrom.

Normally the power of the speech chip is hidden behind the numbers that code these words.

With Talker, you'll be able to form your sentences by selecting from a list of the words available in alphabetical order. These are shown 10 at a time in a window at the top of the screen.

To choose a word, you move a pointer over the list with the up and down cursor keys. If you move off the top or bottom of the window, the preceding or succeeding 10 words are shown respectively.

Once the arrow is next to the word required, pressing Copy will add that word to the sentence you are building up. The new sentence will be displayed below the screen.

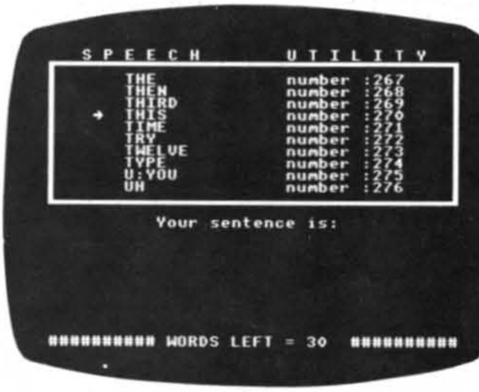
To hear what the sentence now sounds like, press Return.

If you wish to erase the word you've added press Delete.

Stepping the pointer through the list of words one at a time could become rather tedious, so various faster means are provided.

For example, to move to the section of words beginning with T, simply press Shift + T. Likewise with other letters of the alphabet.

If you want to go to the beginning of the list, press Shift together with the cursor up arrow. Similarly, to move to the foot of the list, press Shift with the down arrow.



```
S P E E C H              U T I L I T Y
        THE              number :267
        THEN             number :268
        THIRD            number :269
   →    THIS             number :270
        TIME             number :271
        TRY              number :272
        TWELVE           number :273
        TYPE             number :274
        U:YOU            number :275
        UH               number :276
            Your sentence is:




########### WORDS LEFT = 30  ###########
```

Once you have the sentence written to your own satisfaction, you can display the various sound statments that make it up by pressing function key f0.

You'll be given the option of listing to a printer or to the screen ready to be incorporated in your own programs.

Although intended as a utility program, Talker has been found to be great fun as a program in its own right – allowing people to doodle with the speech chip.

It's particularly come into its own in the primary classroom where the government's scheme has ensured plenty of speech chips.

However, as it stands, Talker hasn't been Escape-proofed. Instead, there's a comprehensive error procedure where you trap all those typing errors that can creep in when you're entering a listing (PROCerr).

If you want to Escape-proof it once you've got it working, you can simply add *FX200,1 to the start of the program which should disable the Excape key.

However, if you want to use the Escape key as a quick way back to the beginning of the program change line 120 to:

```
100 ONERROR GOTO 5000
```

and add line:

```
5000 CLEAR: VDU3: SOUND -1, 194 ,0 ,0
:SOUND -1, 246, 0, 0 : SOUND -1, 131,
0, 0 : GOTO 120
```

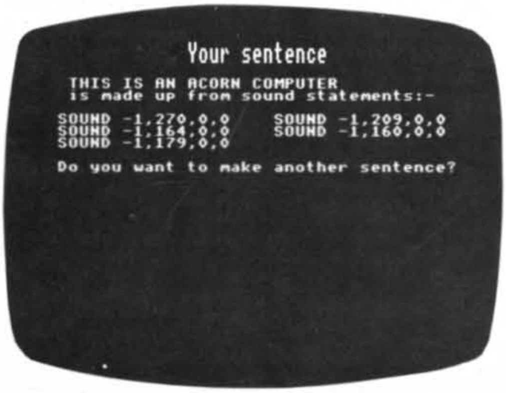
To complete it, you can take the sting out of Break with:

```
1 *KEY 10 OLD¦M RUN¦M
121 *KEY 10 OLD¦M RUN¦M
```

This will keep the program running, even if you do lose the data. There's so little in this program, it's hardly a tragedy.

Well that's enough to keep you lucky speech chip owners busy this month. We'll have another project for you next month.

Incidentally, if you've come up with any useful combinations of the words stored in the Phrom, why not share them with the rest of us?



```
            Your sentence
 THIS IS AN ACORN COMPUTER
 is made up from sound statements:-
SOUND -1,270,0,0     SOUND -1,209,0,0
SOUND -1,164,0,0     SOUND -1,160,0,0
SOUND -1,179,0,0
Do you want to make another sentence?
```

Turn to Page 141

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Switchable modem between 1200/75 and 1200/1200 baud rate that allows you to communicate with services like Micronet, Prestel, Easylink or with other computer users at 1200 baud rate.

Modem	£84.00
Lead	£5.00
Software	£19.95

Telemod 3

BT approved – switchable between 75, 300/300, 1200/75, 75/1200 and allows you to communicate virtually anywhere in the world. It will allow you to communicate with services like Micronet, Telecom Gold, Prestel, One-to-One, Easylink, Microweb. It comes as a standard with built in board for auto-answer.

Modem	£170.00
Lead	£8.00
Software	£19.95

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RAVEN-20
RAVEN 20

EXPANSION BOARDS

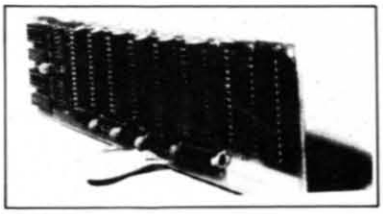
RAVEN-20 BOARD

The RAVEN-20 is a 20K RAM EXPANSION for the BBC Micro, Model B, fitted with O.S. 1.2.

This specially designed product plugs in to the CPU socket of your micro (centre socket of the 3 available) with the minimum of effort. The pins are specially custom made, thus avoiding any possible damage to the circuitry.

The RAVEN board provides the user with an extra 20K of usable RAM in screen modes 0 to 3. This together with the aid of software makes the system completely transparent to both the user and the computer.

The RAVEN-20 software ROM gives much more than just the standard commands, it has been programmed to give more and better commands! Priced at £69.95 inclusive of VAT. Please add £1.50 for post and packing.



RAM-ROM BOARD

The RAM-ROM extension board gives an extra 6 sockets for extra ROM's and 2 slots of RAM. This RAM is not an extension of BASIC. It is intended that the RAM be used to develop your own ROM based software. There are in fact seven sockets on the board, the 7th replaces the socket on the main board that would otherwise be taken by the ROM board. (The RAM-ROM board can accommodate both 2764 type EPROMS as well as 27128 EPROMS and ROM).

The RAMAMP board will not cause overheating. It comes with fully fitting instructions, tested and heat tested before despatch.

Prices: 1 x 16K RAM fitted £55.00. 2 x 16K RAM fitted £65.00.

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'COPTER DOGFIGHT

Two-player aerial action!

By JOHN THORPE

FUN as demonstrating human superiority to your micro can be, occasionally even the most avid player longs to test his prowess in combat with a fellow games addict.

This month we've decided to cater to this gladiatorial urge with Helicopter Dogfight, a game of cunning, quick reactions and unmitigated aggression.

Each player has six helicopters and must shoot down all his opponents' machines to win.

The helicopters have five shots each and the number of shots left is shown at the top of the screen. You can reload at anytime by landing at your own take-off point.

The helicopters accelerate and therefore do not turn instantly when the direction is changed. They stop slowly and then accelerate in the opposite direction. As the helicopter turns it can be flown backwards.

You can hide behind the hill to avoid your opponent, but be careful not to fly into it as you will be destroyed.

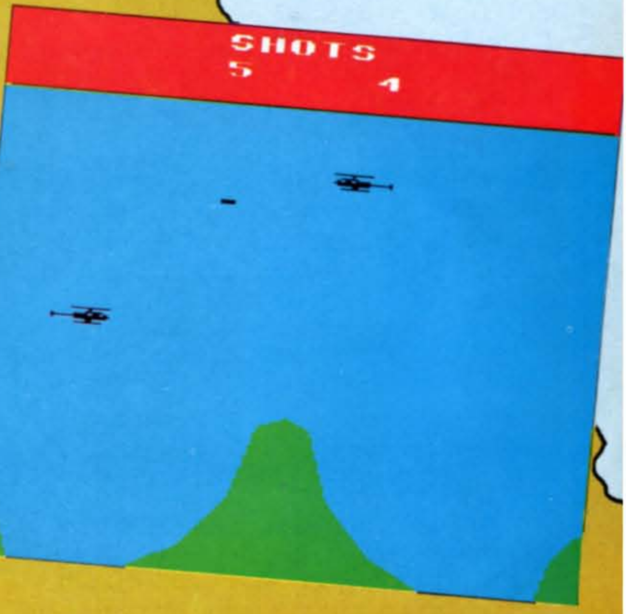
The number of wins each player has is shown at the end of each game. Keys or joysticks can be used for control – details are in the program which starts on Page 147.

PROCEDURES

Title	Title screen.
Inst	Instructions.
Set_up	Sets up screen at start.
Heli_one	Movement of black helicopter, also checks for collisions.
Heli_two	Movement of red helicopter, also checks for collisions.
Fire_one	Fire procedure for black helicopter.
Fire_two	Fire procedure for red helicopter.
Score	Displays shots left.
End	Finish of game and restart.
Joy_one **Joy_two**	Joystick control.
Key_one **Key_two**	Key control.
Explosion	Creates explosion at the appropriate position.
Delete_one **Delete_two**	Delete helicopters at top of screen when a life is lost.
Tune	Plays tune.

VARIABLES

X%, Y%	Position of black helicopter.
U%, V%	Old position of black helicopter.
x%, y%	Acceleration effect of black helicopter.
A%, B%	Position of red helicopter.
C%, D%	Old position of red helicopter.
a%, b%	Acceleration effect of red helicopter.
M1%, M2%, M3%, M4%	Position of bullets.
Count%, count%	Keeps count for bullet distance.
S%	Passes numbers to PROCExplosion.
shot%, SHOT%	Keeps count of shots.
life%, LIFE%	Keeps count of lives left.
M%	Red wins.
N%	Black wins.
P,D	Reads data for tune.
F%, R%	Flags used for direction of helicopters.
I%, J%	Flags used in shooting routine.



Plug your BBC Micro into the exciting world of telecomputing

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THE Pace Nightingale modem and Commstar software has been hailed by the computer press as the perfect combination to go with the BBC Micro.

Now *The Micro User* can offer the total package for £139.95 – which includes VAT. And with it we will send you vouchers giving substantial savings off the enrolment fee to two of the biggest on-line services in Britain.

You will receive a 20 per cent discount to Knowledge Index, which has a database totalling 22 million different items, and a 50 per cent discount to One-to-One, which offers an electronic message service and links you to the international telex network.

The Nightingale modem, which is fully BABT approved, allows all the baud rates, full and half duplex, that you'll ever need. It is supplied with a lead suitable for connection to the BBC Micro.

The Commstar ROM is the most comprehensive software yet written for the BBC Micro. It is extremely easy to use and lets you link into Prestel, Micronet, Viewfax and Telecom Gold, as well as bulletin boards and databases all over the world.

This total package will allow you to talk directly to other computers, to send your own telex messages, to go tele-shopping – even to download hundreds of free software programs directly into your BBC Micro.

To take advantage of this offer use the coupon on Page 181.

TeleLink

– the magazine with all the facts

IT'S your ideal introduction to all the fascinating opportunities that become available to you when you link your BBC Micro to the telephone.

You'll be able to learn all about the many facets of the exciting new world of videotex – about the vast databases held on Prestel and the other public and private viewdata services. About how to use electronic mail and bulletin boards. About how to go teleshopping, and how to download telesoftware into your micro.

TeleLink deliberately steers away from technicalities to present the facts in vivid detail – to help you play your own part in the communications revolution that is going to change all our lives.

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Additional programmes in the ECHOSOFT Series are in the course of preparation and will be released shortly.

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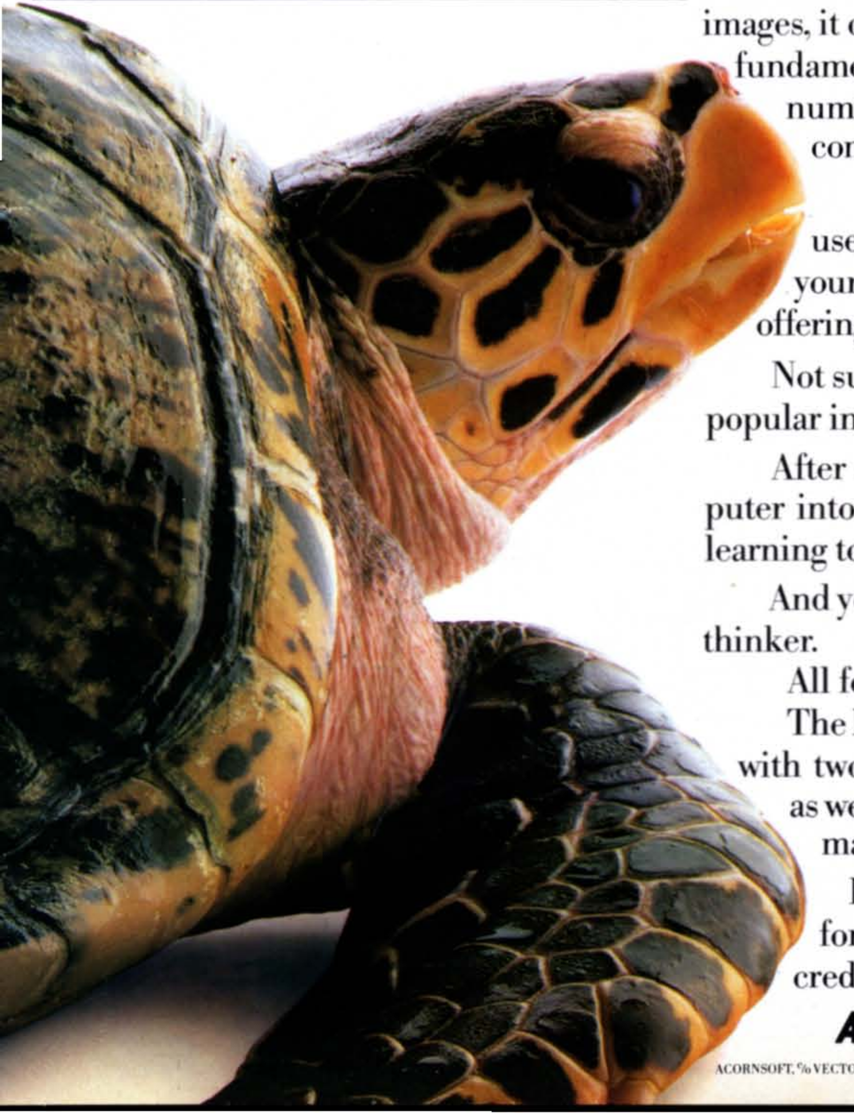

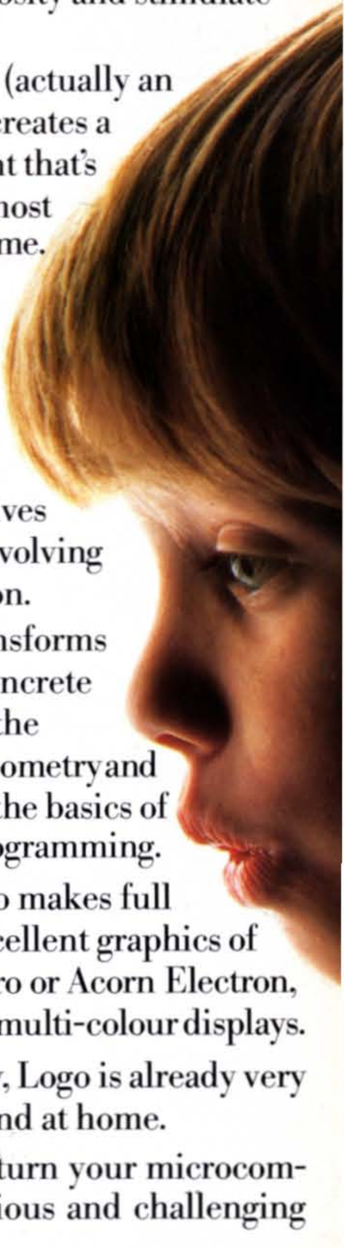

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The Logo turtle (actually an on-screen triangle) creates a learning environment that's as much fun as the most exciting computer game.

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Using everyday language, the child gives simple commands involving distance and direction.

As the turtle transforms abstract ideas into concrete images, it combines the fundamentals of geometry and numbers with the basics of computer programming.

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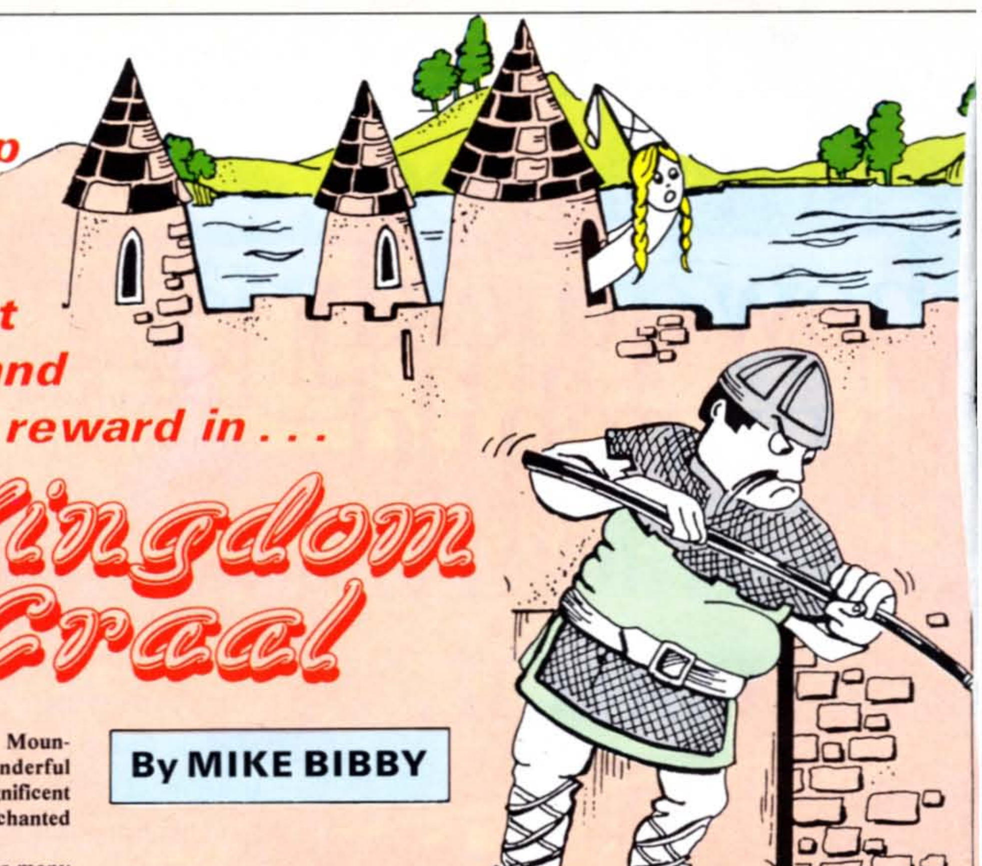


By MIKE BIBBY

FAR far way, beyond the Ice Mountains, lies the weird and wonderful Kingdom of Craal with its magnificent palace, crystal clear lake and enchanted forest.

It is a peaceful land, ruled for many happy years by King Meek who was respected by most of his subjects for his good nature and integrity – and his rather dishy, if inefficient, handmaiden Jut.

There was one character however who was not party to this overwhelming admiration – Vadham the evil wizard.

Many years ago, he was banished to the castle dungeons for trying to nick the king's gold plated penknife – the one with a special blade for taking stones out of horses hooves.

In his spare time when he was not mixing spells or playing Frak, he turned the dungeon into a labyrinth of despair, where only the brave had the courage to enter. Having said that, we haven't seen any of them come back yet.

You were born in Craal the handsome son of a cobbler and many years ago you decided to seek a fortune in far off lands.

You returned many times over the years to visit your old mum and dad and spend the occasional happy hour in the company of the king's daughter Andrea.

What was once a childhood crush blossomed into love, and you have returned for good to claim your bride.

Alas on this last visit you found the king dead and the palace in uproar. The wizard had taken a heaven sent opportunity and, as the king opened the door down to the dungeons to let out the castle moggie, he grabbed his magnificent gold crown and disappeared into his hidey hole in the depths – better than a penknife no doubt, but not much use for getting things out of horses hooves.

You, in your typical youthful manner, were only interested in your future wife– Andrea. The palace guards, the footmen, the courtesans and even Ethel the cleaner, however, were not impressed with your infatuation and by a unanimous decision volunteered your services to retrieve the crown.

They threw you head-over-heels down the dungeon steps with a warning that should you return empty handed all your beloved possessions would be forfeit, even your subscription to *Micro User*. Some people stop at nothing.

Well, you have your challenge and you don't really have much option but to accept it.

In this serious adventure you have at your disposal six single letter commands. These are n, s, e, w, l and i – for the four compass directions, plus look and inventory. Notice – they're all in lower case.

The program will also accept other standard adventure commands such as take, drop, hit and say. These words are intelligent, which means that if you have a key and want it in a lock, all you need to say is 'Drop key'. It will automatically go in the lock.

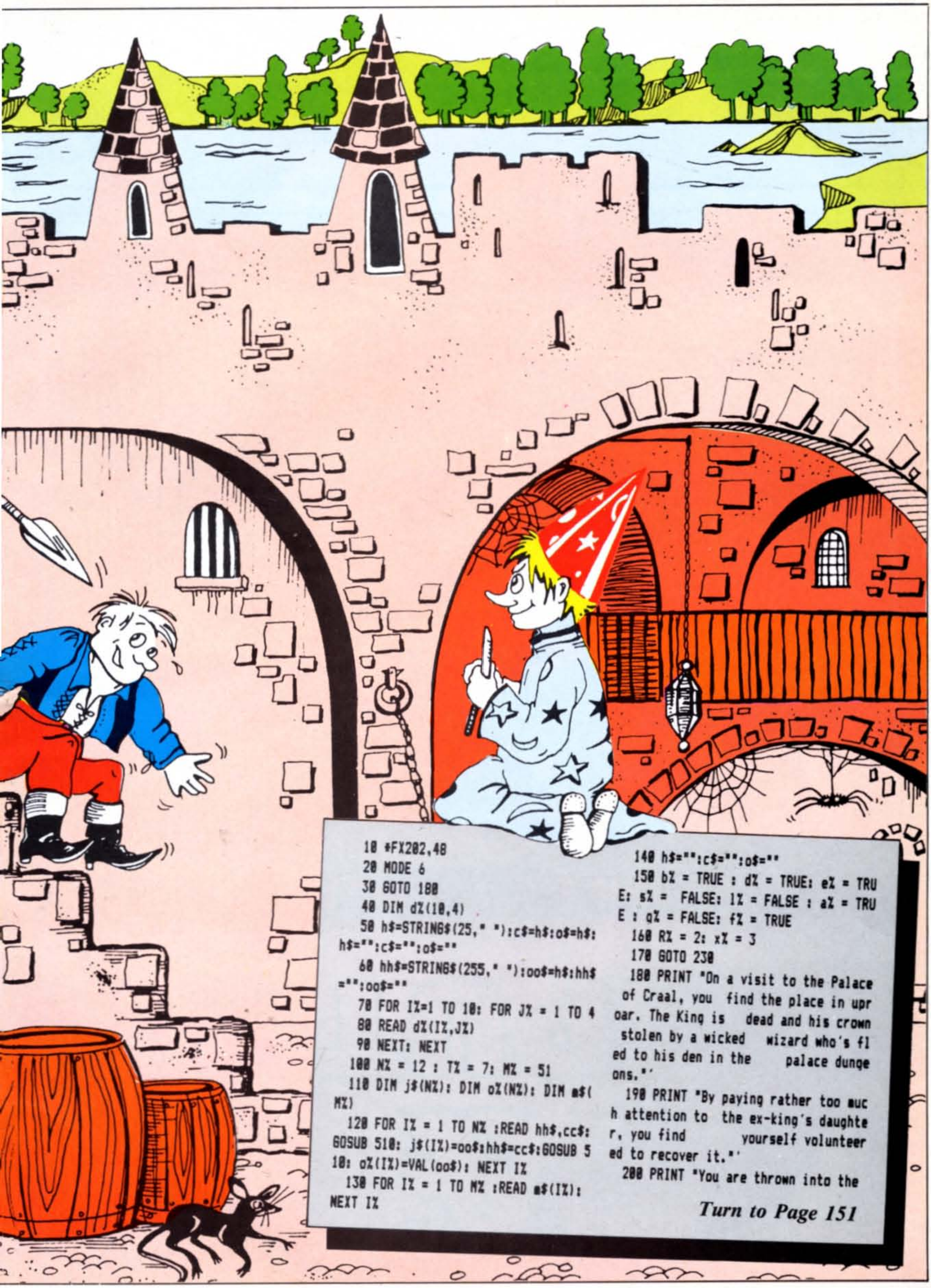
Now there's not much point in your typing in an adventure and finding, as you do, all the solutions within the listing. In order to conceal the clues therefore, I've written the important messages in code and they're all in the data statements at the end of the program.

There's nothing clever in what I've done, and I'm sure you'll soon spot that all the printed text has been offset by three letters. The sub-routine starting at line 510 decodes it all and turns it into sensible English in the finished product.

It is imperative that great care is taken when entering these data lines if you are to enjoy the result of your toils.

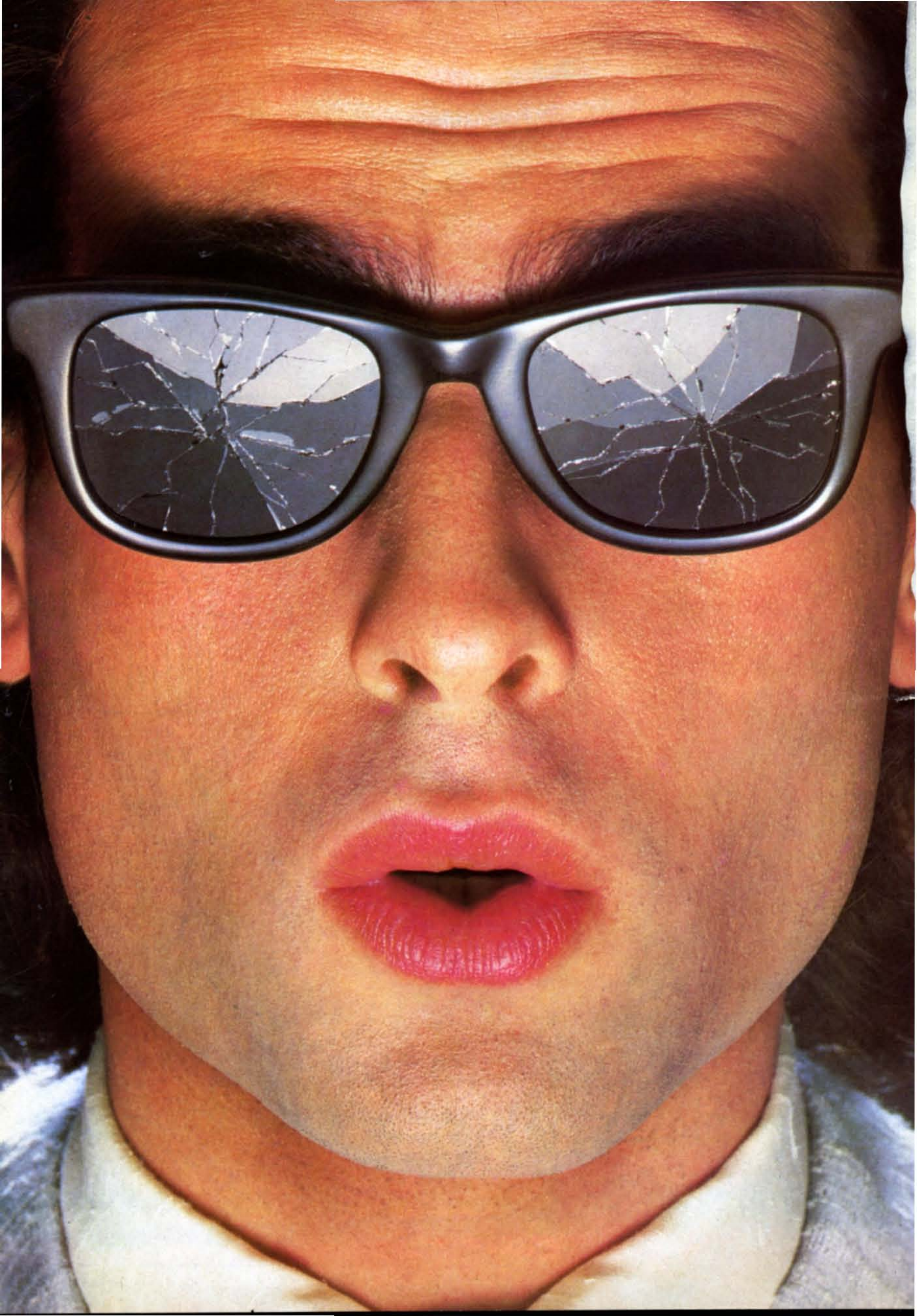
Well, I think I've told you enough now. Any more hints and it wouldn't be much of an adventure, would it?

It only remains to wish you luck when you set out in your search for the crown – you're going to need it!



```
   10 *FX202,48
   20 MODE 6
   30 GOTO 180
   40 DIM d%(10,4)
   50 h$=STRING$(25," "):c$=h$:o$=h$:
h$="":c$="":o$=""
   60 hh$=STRING$(255," "):oo$=h$:hh$
="":oo$=""
   70 FOR I%=1 TO 10: FOR J% = 1 TO 4
   80 READ d%(I%,J%)
   90 NEXT: NEXT
  100 N% = 12 : T% = 7: M% = 51
  110 DIM j$(N%): DIM o%(N%): DIM m$(
M%)
  120 FOR I% = 1 TO N% :READ hh$,cc$:
GOSUB 510: j$(I%)=oo$:hh$=cc$:GOSUB 5
10: o%(I%)=VAL(oo$): NEXT I%
  130 FOR I% = 1 TO M% :READ m$(I%):
NEXT I%
  140 h$="":c$="":o$=""
  150 b% = TRUE : d% = TRUE: e% = TRU
E: s% =  FALSE: l% = FALSE : a% = TRU
E : g% = FALSE: f% = TRUE
  160 R% = 2: x% = 3
  170 GOTO 230
  180 PRINT "On a visit to the Palace
 of Craal, you  find the place in upr
oar. The King is   dead and his crown
 stolen by a wicked   wizard who's fl
ed to his den in the      palace dunge
ons."'
  190 PRINT "By paying rather too muc
h attention to  the ex-king's daughte
r, you find          yourself volunteer
ed to recover it."'
  200 PRINT "You are thrown into the
```

Turn to Page 151



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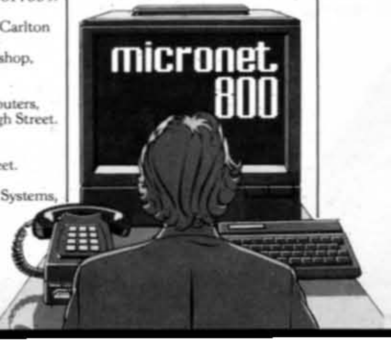

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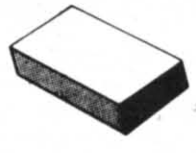

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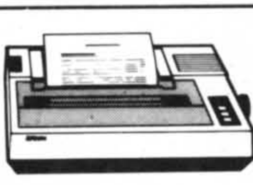

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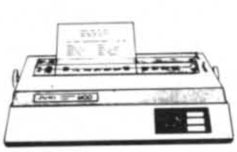

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Update on the latest releases

Wordwise upgraded

WORDWISE has been totally upgraded, and is far more powerful than ever. But users of the old Wordwise needn't worry – it works exactly as before. The only difference is that there's a new, ninth option on the main menu.

Not that you need to take any notice ... just keep on typing as you did before and Wordwise will work as you're used to – except for some extremely handy additions to improve user-friendliness.

It's the ninth option that's the interesting one though – this allows you to use segments.

A segment is a sort of mini-Wordwise. Once a segment is selected, to all intents and purposes you're working on a "new sheet" of Wordwise.

You can type away here quite happily just as you would ordinarily, saving and loading files, doing searches and so on.

The uses of such a simple idea are legion. For example, if you're writing chapter one of a book and suddenly have an idea for chapter two, you simply open a segment for chapter two and write away until you've got the idea off your chest.

Then you can continue with your original train of thought by going back to the main menu.

There's much more to it than this, however. Wordwise Plus incorporates its own simple yet powerful programming language.

By writing such programs in segments you can perform mail merges, sorts, print text in columns and so on.

You can even load previously saved screen pictures and dump them from within Wordwise, illustrating your text.

To make it even easier, most of the above examples are supplied on cassette.

And if you've got an old Wordwise, don't worry – you'll be able to upgrade it to Wordwise Plus. All you have to do is to send Computer Concepts £19.55 together with your old chip plus manual and you'll get the updated ROM.

ADE for the tube

NEWLY arrived from System is their tube-compatible ADE chip. In fact it's more than compatible because if the tube is present, it makes full use of it – the editor going immediately into 80 column mode.

The in-built assembler also takes advantage of the RAM above ADE when the latter resides in the second processor. ADE loads its files into this area automatically. The object code derived can then be saved lower in memory, effectively doubling assembly speed.

Also introduced is a facility for local symbols, enabling you to block structure programs. Not only this, multiple object files can share symbol tables, allowing the use of overlays.

Rummaging in ROM

BBC Micro owners who'd like to delve into the Basic ROM need no longer be frustrated by Acorn's "censorship" of Jeremy Ruston's Compendium.

The "Basic ROM User Guide" from Adder is a fully documented, extremely well explained account of Basic's workings.

Full of interesting insights, and useful routines, the guide clearly explains what goes on in the Basic Interpreter – and, for once, you don't have to be a computer genius to understand it.

If you've ever wondered "what's going on in there", this is the book for you. It certainly wins our award for the best microcomputer book of 1984.

Mike Bibby

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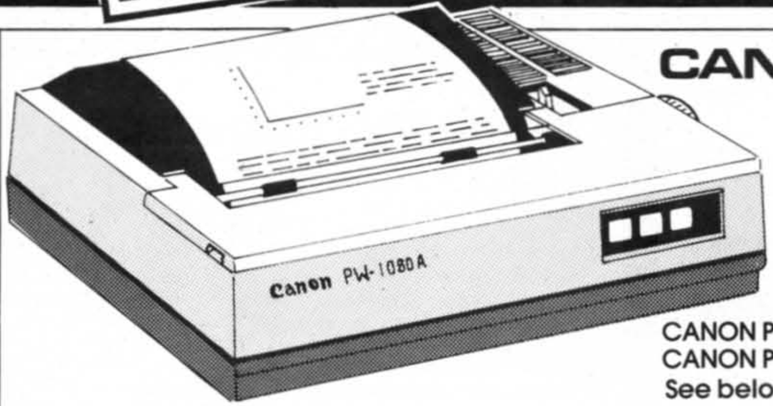

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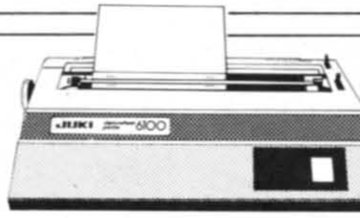

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FORGET ABOUT THE REST!

JUST IN...

Update on the latest releases

Logotron challenger to Acorn Logo

A NEW ROM-based Logo which seems set to challenge Acornsoft's recently selected version has been produced by Logotron.

It is a full implementation of the LCSI standard and has been produced by a dedicated band of Logo enthusiasts.

It has been given the official blessing of the inventor of Logo, Seymour Papert.

First impressions are it is faster than Acorn's Logo, has better documentation and a superior editor.

It also makes full use of the 6502 second processor, and works with tape or disc.

Promised in the near future is an add-on sprite board for the system.

Programmers' ROM

THE latest ROM from Beebugsoft should prove a boon to harassed Basic programmers – and editors.

Single step monitors have long been around for machine code freaks but Sleuth, as it's aptly titled, provides single or multi-stepping through Basic.

In fact it's got a lot of features more usually found in machine code monitors. You can insert breakpoints, display and alter variables and even change program flow.

As well as a trace function, there's a decelerator option that slows the program down to a rate we lesser mortals can follow.

A powerful dual source screen feature allows you to toggle between the display of the program under investigation, and Sleuth's own control/command screen.

Strathclyde Basic

A SYSTEM for learning Basic by the Strathclyde method has been introduced by Logic 3.

Learn Basic Programming on the BBC Microcomputer is a comprehensive package featuring clear text, two tapes of example programs and a unique flowchart with a cloud for fuzzy operations.

Initial impressions are that the book is even better than its venerable ancestor.

It is packed full of examples and experiments, which is a nicer word than problems.

The contents are cogently and entertainingly explained throughout.

One aspect that may raise a few eyebrows is that it fails to make use of BBC Basic's structured constructs – it abounds in GOTOs and has a dearth of PROCs.

Despite the author's apologia in the introduction, this may hamper its sales in education.

Low-line ROM

LATEST in the crop of external sideways ROM sockets is Care Electronics' low profile system.

In effect this is an upgrade of the Viglen system which Care designed and manufactured. Its claimed improvements are lower height – the cartridge plugs in sideways – and a sturdier DIP plug for inserting in the micro's sideways sockets.

Mike Bibby

SATAN'S CHALLENGE

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In taking up the challenge you have to find the TALISMAN and locate a pentagram which then has to be prepared for the final rite. In the mean time dark forces will be opposing you making a difficult task almost impossible.

Do not allow yourself to the lulled into a sense of security for it will be short lived.

Many have gone before only to swell the ranks of the damned.

This is the latest adventure from the stables of Microtest and has been written with the acclaimed features of other adventures in mind eg save facility, quick response, simple but extensive commands, a mixture of logical and fiendish problems to solve.

Be warned this is an easy adventure to get into but devilishly difficult to end.

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MICROTEST FONT ROM

This exciting new ROM from Microtest will enable you to get all sorts of new characters and fonts from your BBC Computer. Once you have produced your masterpiece on the screen, all you have to do is use the inbuilt screen-dump utility to produce a hard copy onto paper.

Typing '*HELP FONTS' gives a list of available fonts and the blocks of characters which they replace.

Available fonts are:

***Accents**	Accents and miscellaneous.
***Block**	Small capitals.
***Data**	Like the bottoms of cheques.
***Greek**	It's all Greek to me too!
***Joined**	Standard capitals with joined up lower case.
***Maths**	A mix of until now unobtainable Mathematical symbols.
***Miscellaneous**	A few oddities which often are very necessary.
***Thick**	Thick text (for MODEs 0&3) to enhance 80 column mode.
***Thin**	Thin text (for MODEs 2&5) which makes modes 2 & 5 much more readable or perhaps "READABLE".
***MODE 8**	Ten column multicolour, memory-miserly mode.
***Vertical**	For labelling graphs.
***S DUMP**	A dump facility which will produce a screen dump of any MODE from 0 to 8 (including a text only dump in MODE 7) on an Epson, Star, CTI CP80 or MT80

The ROM uses absolutely NO user memory and can be used with word processors etc. as well as normal BASIC programs. The DUMP utility will produce positive or negative graphics and will also rotate the picture produced through 90° as well as being able to position the picture anywhere laterally across the sheet of paper.

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VI.4 STARSTICK was 4K the new version has been squashed into 8K.

The NEW ISSUE ROM is compatible with latest* ACORNSOFT programs as well as REPLICA II.

As with the VI41 issue of ROM you can at last connect good "self centring", "rapid action" joysticks to the BBC Computer via the user port. (Model A owners please note that you do not need the analogue interface fitted to your computer but you will need the user port and IC76).

Pressing any combination of the BREAK key does not effect the STARSTICK software and now by pressing TAB-BREAK REPLICA II is auto booted and is compatible with the STARSTICK ROM V2+.

The software patch provided in the ROM monitors O.S. calls and patches the Joystick to the Games programs, and so will work with most games programs even programs not meant to function with Joysticks (except those using illegal direct memory addressing).

The new command summary and description is+ –

*STICK	enables the ROM.
*NSTICK	dissables the ROM.
*SETSTICK	program joystick.
*KSAVE	save protocols set by *SETSTICK.
*KLOAD	load protocols saved by *KSAVE.
*MAP	remap current keyboard definitions, play games using your favourite keys.
*CLEVER	intelligent loading of software (ensuring ACORN compatibility).
*PLONK	relocate area of work memory used.
*PROP1	proportional joystick emmulator 1.
*PROP2	proportional joystick emmulator 2.
*ANA	patches joysticks via the analogue port to games.
*KILL	ROM manager, dissables troublesome ROMs.
*DOUBLE	replace up to two joysticks.
TAB-BREAK	Auto boots REPLICA II.
*PAUSE	define key to freeze game.
*NPAUSE	dissable *PAUSE.
*NAME	predefined key protocols.
*HELP KEYS	display current key protocols.
*REPEAT	enables ROM based auto repeat.
*NREPEAT	dissables *REPEAT.

Should a contention state occur when two roms or more try to use the same *command prefixing any of the above with M will help solve the problem.

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Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

All MICROTEST ROMs are fully TUBE® compatible. (TUBE® is a reg. trademark of Acorn Computers).

Make the change from UPPER to lower

Neaten up your listings and learn more about Basic with EDWARD JOHNS

PROCCHANGE is a Basic utility which changes all procedure names in a program into lower case. Not only can this improve the presentation of your programming masterpieces, it should provide an insight into the way Basic works.

The routine is written completely in Basic and is designed to sit at the end of the program you wish to change.

It works by looking through the Basic text until it finds the token for PROC. A token is a byte used in place of a reserved word such as PROC – a form of numerical short-hand.

Tokens are used, as opposed to storing each character of the command, in order to save memory. A token only requires one byte of memory whereas storing the whole string takes up N bytes, when N is the length of the string. For instance, by using a token for PROC we save three bytes of memory.

When the token for PROC, 242, has been found, all characters after it are turned into their lower case equivalent.

This is repeated until a colon, carriage return or left hand bracket is found – these being the only three characters which can be used to terminate the procedure's name.

We do this by using a counter starting from location PAGE+4, and ending at TOP.

The counter starts at PAGE+4 to avoid inclusion of the data corresponding to the line number and line length of the Basic text. The counter must always skip this data for each line in the program so as to avoid any confusion with the text.

For instance, the byte that stores the length of a line might have the same value as one of the tokens.

To make sure this happens, each time a character 13 – the end of line marker – is found, the counter is increased by four to point to the next line of text: two bytes are used for the line number and one for the start of next line pointer.

The counter is incremented until it reaches the end of the Basic text – the pseudo variable TOP defines this.

ProcChange starts at line number 30000. This allows it to be safely positioned at the end of a Basic program without fear of clashing line numbers. If you use line numbers greater than 30000 in your program re-number it to avoid clashes.

The extra lines can be added either by typing them in or loading in the additional lines at the end of the program. Merging by *EXEC can also be used, but can be a bit confusing, and rather slow using tape systems – page 402 of the User Guide gives details of how to merge Basic programs.

(For a fuller explanation, see Backgammon Revisited on Page 130 of the January 1985 issue.)

The easiest way is to *LOAD the extra lines at the end of your program. To do this we must save ProcChange onto tape or disc, so we can load it at the end of the Basic program when required.

The location where the extra lines are to be loaded can be found by calculating the value of TOP-2. Loading a program at TOP-2 "tags" the saved program onto the end of the main Basic program in memory.

This is quite a simple location to calculate, all we do is type:

```
PRINT ~ TOP-2
```

A hexadecimal value will be returned. We will call this XXXX. Now we *LOAD the extra lines at location XXXX – this simply adds them onto the end of the existing program as if they have been typed in. We do this by entering:

```
*LOAD FILE XXXX
```

where FILE is the name you'd previously saved ProcChange under.

The additional lines will now have been added to the program. To execute ProcChange enter:

```
GOTO 30000
```

All procedure names will now be changed into lower case. The additional lines can now be deleted and the new program saved. *(If you're as paranoid as I am you'll always keep a backup copy of the unchanged program to be on the safe side.)*

It should be noted that any references to PROCs in REM statements will not be changed. This is because all data after a REM is left un-tokenised – in other words it is left in its original "long-hand" form. The same is true for procedure names within quotation marks.

Another thing you should remember is that having two procedures with the same name can create a headache.

Normally, two procedures with the same name can only be used if one is in upper case and the other is in lower case. The problem is that the upper case procedure name will be changed to lower case, making them identical causing problems.

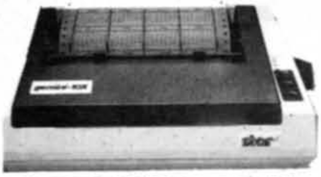
But it's bad programming practice to have the same name for procedures, so this won't affect you will it?

Don't worry if it takes a minute or so to revamp larger programs. After all, it's only in Basic . . .

Anyway, it's time to type in the listing and try it. You'll be amazed how much it improves the appearance of your work.

```
30000 H%=PAGE+4
30010 J%=?H%
30020 IF J%<>242 THEN 30080
30030 REPEAT
30040 H%=H%+1
30050 J%=?H%
30060 IF J%>64 AND J%<91 THEN ?H%=
   32
30070 UNTIL J%=13 OR J%=58 OR J%=40
30080 IF J%=13 THEN H%=H%+4 ELSE
H%=H %+1
30090 IF H%<TOP THEN 30010
30100 END
```

star ATTRACTIONS



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WORDS & PICTURES These early reading games from CHALKSOFT for 3-7 YEAR OLDS will stimulate interest and assist in recognising words to be found in most learning schemes. BBC only — Normal price £9.95. MEMBERS PRICE £7.95. 40 TRACK DISC £10.95

LOOK SHARP Sharpening the powers of observation is great fun with another offering from MIRRORSOFT, with three programs for the VERY YOUNG, and one on the second side to amuse and educate children UP TO THE AGE OF ELEVEN. BBC/Electron — Cassette only. Normal price £7.95. MEMBERS PRICE £6.45.

JUNIOR

ANSWER BACK JUNIOR QUIZ This quiz for 6-11 YEAR OLDS from KOSMOS should provide hours of fun whilst teaching general knowledge. Questions are included on a wide range of topics, and can also be made up and included on the program. BBC/Electron — Cassette only. Normal price £9.95. MEMBERS PRICE £8.45.

BERT BOOT Squashing insects may not sound the most pleasant way to learn multiplication and division, but this program from HIGHLIGHT SOFTWARE for 8-12 YEAR OLDS really is most enjoyable and rewarding. BBC/Electron — Cassette normally £4.95. MEMBERS PRICE £3.95. 40 TRACK DISC £5.95.

SENIOR

NOTE INVADERS This program from CHALKSOFT for 7 YEAR OLDS and over, provides entertaining practice at learning note recognition on the bass and treble clefs. BBC/Electron — Cassette normally £9.95. MEMBERS PRICE £7.95. 40 TRACK DISC £10.95.

ANSWER BACK SENIOR QUIZ As for the junior quiz above, but loaded with more difficult questions to stretch the minds of anyone 11 YEARS OR OLDER. Prices as above.

DECIMALS A more serious program from CHALKSOFT, teaching and practicing the principles of the decimal system suitable for 9 TO 15 YEAR OLDS. BBC only — Cassette normally £9.25. MEMBERS PRICE £6.45. 40 TRACK DISC £10.95.

O & A LEVEL:

Comprehensive list of specialised titles available to members.

PLUS MANY OTHER TITLES IN MEMBERS CATALOGUE

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TITLE	BBC/ ELECTRON	TAPE/ DISC	PRICE
Membership Fee of £2.00 if new member			
P&P @ 50p per tape (Free if 3 or more ordered)			
PAYABLE TO FIRST BYTE COMPUTERS LTD TOTAL			

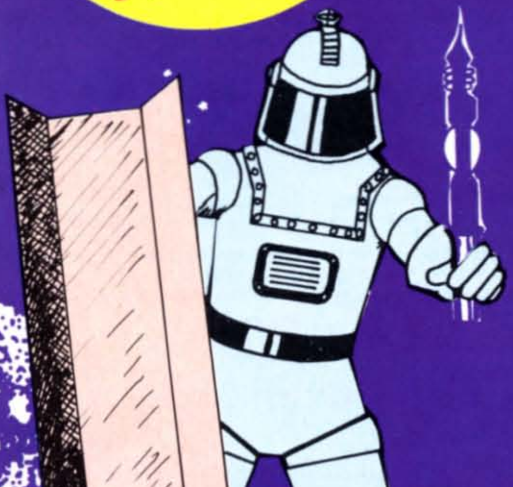
Non-members are welcome to buy at RRP

MU2

EXCLUSIVE TO BUYERS OF THE MICRO USER MONTHLY DISCS OR CASSETTES . . .

We now include with each month's *Micro User* disc or tape a superb game or utility rivalling the most successful commercial software in quality and scope. And it's totally free! This month's choice is:

Atomic Protector



THIS month's free program for purchasers of *The Micro User's* monthly tape or disc is Atomic Protector – a fast and furious machine code game that has been retailing for £6.95.

It puts you in charge of vital uranium deposits, which are your only means of life support, and you come under attack from hordes of hostile intruders, determined to steal your precious isotopes.

Armed only with a laser cannon your task becomes more and more testing as the numbers of aggressors increase.

To add to your troubles, one by one the intruders begin to achieve critical mass. You must catch and deal with each as soon as possible if you're to survive.

This is a fast, fascinating and compulsive game that will become a firm favourite with all the family.

DON'T FORGET!

TWO superb pieces of high quality software come absolutely free with the December and January monthly tapes and discs from The Micro User.

The December extra is the highly acclaimed Omega Probe – a high speed, all action machine code arcade game that has won rave reviews from the computing press.

The January tape/disc has as its bonus Galactic Tycoon – a game of financial endeavour in the further reaches of space that will intrigue players of all ages.

Omega Probe
GALACTIC TYCOON

To order your tape or disc complete the coupon on Page 181

The SEVENTH annual Kansas

SALE

Making space for all our new programs, last year's stock is being cleared at the most ridiculous prices ever!

£12.50 utilities at £5.95 each!

# MICROTYPE
Acknowledged as the Standard in typing tutors and used by many educational authorities and by industry.

# DATA FILE
Define from one to 20 fields of any length and with any title. Full search, save, print and edit facilities. Now available as a disk version at £1.50 extra.

To facilite the transfer to disk there is now NO PROTECTION whatsoever on any of our cassette programs!!!

The £9.50 games at a ridiculous £3.95 each!

GALACTIC FIREBIRD
Our best selling Arcade game, with the ever circling, swooping Firebirds with megon bombs and astro blasters thrown in. Seven absorbing levels.

COSMIC FIGHTER
Multi screen with four different types of alien each with its own brand of attack. Dock with the mother ship to refuel before it gets harder.

BOMBER SCRAMBLE
Level after level, with two types of fighter, intelligent rockets, blimps and even ack-ack. Bomb the ground installations whilst fighting.

# FIGHTER PILOT
Take off, find the enemy on the radar then get after them to blast them out of the sky. 3D. Graphics of runway and radar and enemy.

F FOR FREDDIE
The hardest game you will ever play! Needs 36 keys to prepare, take-off, fly and land Freddie. You will not master it in a night!

# DRACULA ISLAND
A traditional adventure. Split screen, game saving facility and is totally logical. Find Count Dracula before he get you, and use the stake!

# RING OF TIME
Another Adventure, but this time the Ring is the problem.

ZORS REVENGE
The most difficult of these three Adventures. But we have a Help? service!

MAGIC ADVENTURE
Lots of pretty pictures and simple operation, designed especially for the children from around four to eight years. Used in over 100 schools.

The Arcade games are all fast action either keyboard or joystick and of course are written in machine language.

The £10.35 games at £4.95 each!

# PINBALL ARCADE
Design, build, play and save your own Pinball boards. You can alter the bounce, the score, the tilt and even the strength of the flippers. And of course all the pieces can be moved anywhere on the board. The only program to have received FIVE five star reviews!

SWORDS AND SORCERY
The first and only Quest for the Beeb. Much more than an Adventure, with helpers you can recruit or abandon, magical power, fighting ability, carrying capacity and the like. Nine levels of difficulty with a different scenerio every time, but with a game saving facility for the one you want to continue playing. Uses colour and sound and as a built-in map.

FIVE SPHERES OF GOLIATH
An Adventure with SOUND! Not just a few bleeps, but realistic sounds as you progress. This is our most difficult Adventure to date, with the aim to discover the five spheres in the abandoned space ship which is on auto destruct. But first of all you must escape your cell...

Both Pinball Arcade and Swords & Sorcery are now available on disk with the Data being able to be saved to disk. Add £1.50 each.

The £22.50 # Word Processor at £9.95!

This is the all-feature word processor, using Embedded Control Characters—just a single letter to such as indent, new line, new page, new paragraph, centre text, flush right, different type faces, etc. etc. Full search and replace facilities, editing and a buffer which allows text to be moved around. And much, much more. Supplied on tape, it contains a disk conversion program allowing the making of a full disk version.

You can format to video or printer, select the number of copies to be printed, whether single sheet or continuous, numbering, draft copy or emphasised, adjustable page length, etc. etc.

And of course text can be saved and loaded at will.

The £34 Kmon at £17!

The widely acclaimed Kansas Editor Assembler Monitor and Debugger, which is the only Monitor with both the normal Single-pass AND a unique Two-pass Assembler.

Thirty sensible and useable commands give the machine language programmer every facility he or she will need. It is absolutely ideal for the beginner to machine code programming as the User Guide gives detailed examples of every single command.

Being combined, there is no need for a separate debugger.

There is a very wide range of the important pseudo-ops, with very powerful important editing facilities, which is idiot proof!

Kmon also contains a full Disassembler, and labels can be defined, erased and altered at any time.

It is now very widely used by professionals and regarded as the ultimate Monitor for the BBC.

SALE ENDS ON THE 31ST OF JANUARY. **# Also available at the same price for the Electron**

RING FOR A COPY OF OUR CATALOGUE WHICH ALSO SHOWS NEW PROGRAMS

Kansas

Orders despatched by return first class post. Sent same day if ordered by Credit Card by 4pm. Prices are all inclusive with no postage charges. Our normal lifetime guarantee still applies.

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WIN A SYNTH

Great FREE contest!

LVL
ECHOSOUND
POWER
FREQUENCY
LOW
HIGH
VOLUME
INPUT
10 MV

IF you're a budding Bach, a mature Mozart or an as yet unliberated Liberace, this month's contest is ideal for you.

As one of the winners you'll be able to turn your BBC Micro into a polyphonic organ with the new Echo 1 keyboard from LVL.

If you're a beginner or an accomplished musician this superb touch sensitive keyboard will soon have you exploring the musical possibilities of your BBC Micro.

But if you're the type who's used to having the micro all to himself be warned – the Echo 1 is so simple to use that everyone, friends and family, will be crowding you off your micro.

The reason's not hard to see, for along with Echo 1 comes Organmaster. This powerful yet easy to use software allows you to imitate various instruments such as piano, flute, violin and piccolo, as well as providing a wide range of percussion effects.

As if that were not enough, a synthesiser mode allows you complete control of the voice envelopes, so you can design your own sounds.

And with Echo 1 comes the Echosound, an amplifier/speaker combination capable of delivering more than five watts to its six inch double cone speaker.

At the tweak of a knob you can switch from the whisper of a sobbing violin to the roar of a fairground engine.

There are three Echo 1s plus Echosounds to be won, so how can you resist?

The contest itself couldn't be simpler. What we've done is to take extracts from 16 of the adverts in this issue. All you have to do is find the page the original is on, and let us know the name of the company who are advertising.

And we'd also like to know the title of the tune you think most appropriate to play on the Echo 1/BBC Micro combination – and why. But less than 30 words, please.

Not too hard is it? So get to work, and let us have your entry. It has to get here by February 28, 1985.

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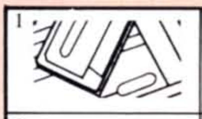
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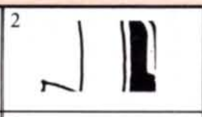
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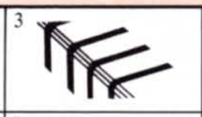
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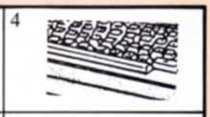
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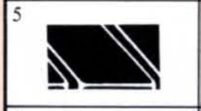
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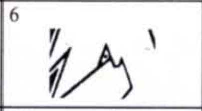
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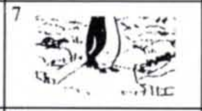
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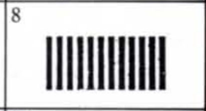
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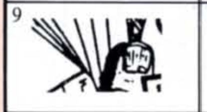
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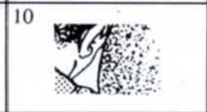
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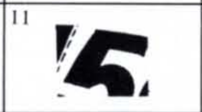
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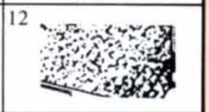
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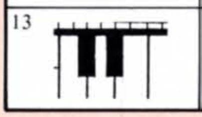
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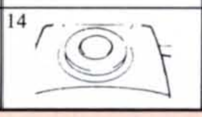
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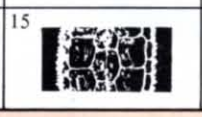
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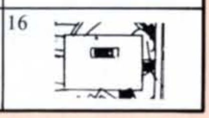

November Contest Winners

I think that photographer's drunk.

He must be – he isn't even seeing double properly!

S.P. Battley, Ipswich.

Only the part that harboured the bugs!

I see my backup copy has had part of his data erased.

Carolyn Hughes, Sevenoaks.

This is the computer to give the women. Clean lines, smooth to the touch, handsome in appearance. Just like me!

Grow up boy. Consider the add-ons. Discs, printer, ROM database. Maturity complete. Like a man with a beard!

Rev. J. McGuire, Biddulph Moor.

Your FREE entry form

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The most appropriate tune would be . . .

____

____

____

Send your entry form to:

Echo 1 Competition, The Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Name ________________

Address ________________

____

Entries must reach us no later than February 28, 1985.

when it comes to upgrading your BBC micro there are two choices

this....

or this....

there's really only one choice -

OAK

Whether you are already an owner or thinking of purchasing your first BBC computer - then the OAK is for you. The OAK offers a versatile unit which can house as much or as little as you require - the beauty being that you can upgrade at any time without having to add-on externally to the OAK unit.

The OAK is available in practically any form, from the basic housing kit (for your existing micro and add-ons) through to the complete ready built unit which, as you can see from the specification, is a pretty sophisticated machine - the mighty OAK.

OAK

ANOTHER UCC QUALITY PRODUCT.

Because of the outward looking design, the BBC Micro Computer has become one of the worlds leading computers. Its popularity is derived from its flexibility as a powerful home computer through to a personal computer widely used in science, education, commerce and industry. This flexibility has been enhanced by the vast range of add-ons that have become available - unfortunately these in themselves have created the micro's major weakness - in many cases they are self-contained units whose cases and cables require a lot of extra space in order to site the computer. This detracts from the overall value of the system.

The OAK computer range overcomes these problems as the vast majority of add-ons are capable of being housed within its own casing.

The OAK has been specially developed to be the most versatile computer system in its field.

The OAK computer

BASIC RANGE.

Model 1.

Processor case Detachable keyboard case	£ 110.00

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Model 5.

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Model 6.

Processor case Detachable keyboard case BBC Model B keyboard BBC Model B motherboard Disc interface 2 x 1 mb disc drives 6502 2nd processor 85 watt power supply unit	£1295.00

Model 7.

Processor case Detachable keyboard case BBC Model B keyboard BBC Model B motherboard Disc interface 2 x 1 mb disc drives Z80A 2nd processor 85 watt power supply unit	£1495.00

ALL OTHER SPECIFICATIONS ARE AVAILABLE - SEE ORDER FORM

All prices shown above are exclusive of VAT and delivery.

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MACRO SAVINGS FOR MICRO USERS

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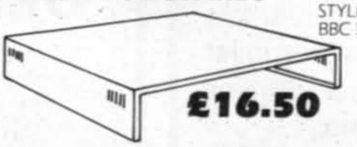

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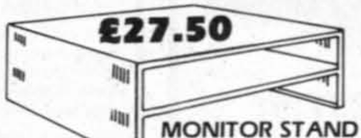

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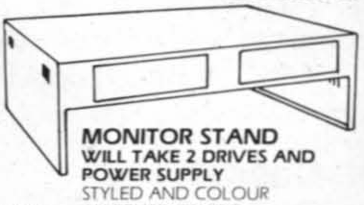

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UCC 500C

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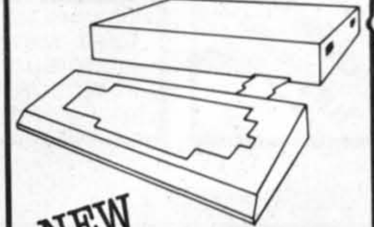

NEW

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STRONG METAL CONSTRUCTION.
Incorporating separate keyboard housing with connecting ribbon cable, and computer housing that functions as a monitor stand.

BBC COMPUTER CASE

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STRONG METAL CONSTRUCTION

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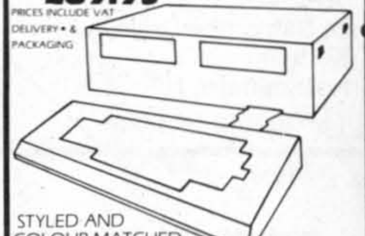

STYLED AND COLOUR MATCHED TO BBC

NEW

Incorporating separate, keyboard housing with connecting ribbon cable, computer housing which can accommodate up to 2 half height disc drives and a separate power supply unit. The computer casing also functions as a monitor stand.

UDM DOUBLE DENSITY DISC INTERFACE FOR BBC MICRO

- Supports single and double density
- Supports 40 or 80 tracks
- ACORN compatible. Runs ELITE, CLARES REPLICA II, MINI OFFICE, BASIC, FORTH BCLP, VIEW, WORDWISE, GEMINI etc.
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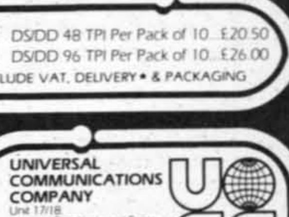

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Powers up to two disc drives including Dual Disc Drive connecting cable, Mains power load and plug.

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For the BBC model B, or Model A with 32k.

Cassette **£17.95**
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(40/80 TRACK)

Now supports over 90 key words

Cheque/P.O. or SAE for details to

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***CREATE/ANALYSE RANDOM DEALS ***

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Ideal for individual practice, analysis and archiving.

Superb teaching aid for clubs and professionals.

Create an infinite archive of hands that can be brought to life on the screen.

Compile special teaching material.

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WILL USE ALL DRIVES AS A SINGLE UNIT

Dealer inquiries welcomed.

DATAMINDER is a powerful and flexible truely disk based database management system. It is designed to minimise the thought and effort required to set-up, maintain, organise and use large collections of data.

Three screen editors are included. The first provides for easy definition of new files or restructuring of existing files. The second functions like a worksheet for the writing and recall of records. A wide variety of record display formats are available some allowing immediate editing of disk contents. A third screen editor opens-up a wide variety of possibilities for producing customised reports containing information selectively drawn from a file and mail merged letters or circulars. Reports can be structured in standard essay format with the bulk of the text sandwiched between an introduction and conclusion.

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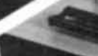

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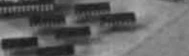

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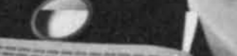

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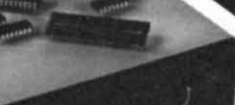

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Software approach to Trak-Ball interfaces

By MIKE COOK

LAST month we saw how we could interface the Atari Trak-Ball to the BBC Micro's analogue input port. However, there were enough unexplored aspects to this to warrant a further article.

The circuit last month integrated the pulses from the Trak-Ball producing an analogue voltage proportional to the ball movement. This allowed existing software to treat the Trak-Ball just like a proportional joystick.

This month, let's see how we can replace that hardware with some software and also use the Trak-Ball for games.

Most interface design involves a trade-off between hardware and software. The simpler the hardware, the more the software has to do to keep up. But as software is inexpensive – it is in this context, as all you have to do is type in the listings – this is a price you might be willing to pay.

However, any software patch has to be grafted into the machine.

This is all very well when writing your own programs but can cause trouble when working with someone else's – especially protected – software. That's why we looked at a hardware solution last month.

A software approach to interfacing the Trak-Ball would seem sensible if you are writing your own programs. As the Trak-Ball already produces pulses, it might seem a little long-winded to turn the pulses into an analogue voltage and then turn the voltage back into numbers. But as I said, it has its advantages.

If you consider the outputs from the Trak-Ball, remember there are two signals for each plane of movement – one giving the direction and the other indicating there has been some movement.

What we can do is arrange the movement signal to trigger an interrupt and then let the micro's interrupt service routine count up or down the total of pulses received. The interrupt service routine could be tucked away somewhere and work independently when needed.

Then all a program would have to do is peek at the memory locations which contain the counts to know where the Trak-Ball is pointing.

We can do this if we wire the Trak-Ball to the user port as shown in Figure I.

Each movement step signal is connected to a control line and the direction connected to the data inputs. The fire button is also connected to an input bit so that you can detect when it is pressed.

The simplest way of making the connection is by using the user port transition board (Body Build Pack 1) and connecting it up with a cable (Body Build Pack 2) as described in the July 1983 edition of *The Micro User*.

If you like, you can cut the socket end off the Trak-Ball and screw the wires into the board. The Trak-Ball wires are colour coded in just the same way as a resistor. That is: brown for pin one and then red, orange, yellow, green, blue, violet, grey and white for the other pins.

Having wired it up, run the program in Listing I. The program assembles the patch in the serial input buffer and accumulates the total in memory locations &70 to &73. When the

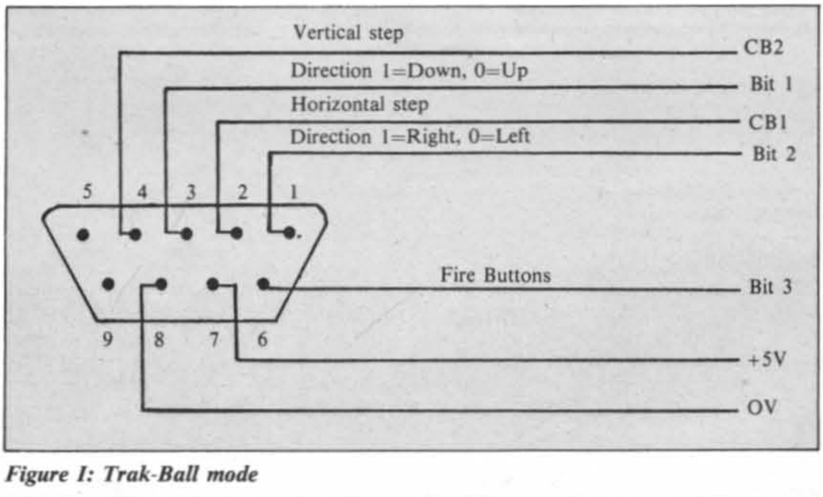

Figure I: Trak-Ball mode

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Part 23

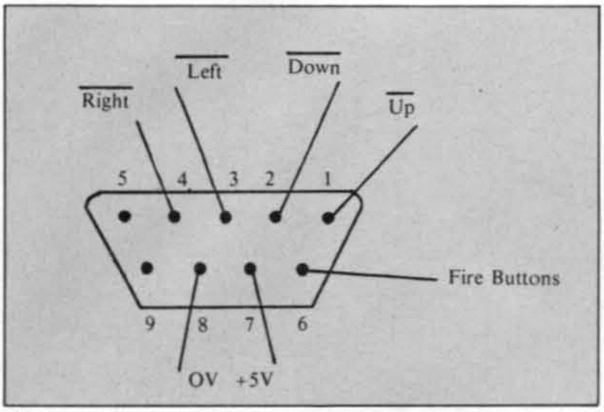

Figure II: Joystick mode

program runs you will get a number for each plane of movement so that you can test that each is working.

When you press Esc, the patch keeps on working, so you can then load any other program that makes use of the Trak-Ball. However, pressing Break removes the vectors and so the patch will not function.

Like all machine code programs this might prove difficult to follow and so a few words of explanation are in order.

Line 30 sets the place for the patch – you can change this to your own favourite place. Lines 40 to 640 contain the machine code patch, of which more later. Line 720 sets the first three bits of the user ports to be inputs and does not disturb the setting of the other bits.

Line 730 makes the two control lines generate interrupts on the falling edge of any input signal. Line 740 enables the interrupts and line 750 sets up the initial counter values to zero.

The user definable keys are then set up so you can keep an eye on the totals when developing a program, and finally lines 780 to 820 loop around printing out the current values in the counters.

Line 710 invokes the procedure to redirect the interrupt vectors. Note that you can only run this program once without pressing Break (and typing OLD) because the interrupt vector is redirected into our patch and the old vector is moved to our storage location.

If this program is run twice then it is our interrupt vector which is moved and so the program will enter an endless loop and disappear up its own op-codes.

You can recover from this by pressing Break, which is what you should have done in the first place.

The patch first saves the accumulator and the X index register on the stack so that we can recover them later and pass the program on its merry way as if nothing had happened.

Then we look at the interrupt flag register in the user port VIA. If bits 3 or 4 are set, this means that we have had a step in one or both directions.

First we get rid of any other bits with an AND instruction and if the result of that is zero then the interrupt was not generated from the Trak-Ball and so we send the program on its way.

We then push the flag register on the stack as reading the input port will reset the flags and we want to preserve the values in case both flags were set.

The AND operation in line 160 tests to see if a horizontal step pulse has triggered the interrupt. If the result is non-zero then it has, so we look to see in which direction to move the counters.

This is done by getting the value of the input port and moving the least significant bit into the carry flag using a rotate instruction.

We can then use the conditional branch instruction which uses the carry to decide if we need to move the count up or down. We then do the same for the vertical direction.

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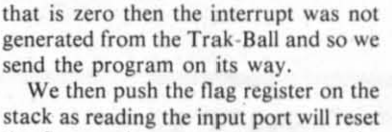

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As this direction signal is in the second bit, we need to rotate to the left twice to get it into the carry flag. There is only one subroutine to increment both horizontal and vertical counters. The count that it increments is set by the value of the X index register before the subroutine is called.

The counters are designed to wrap round on a 10 bit count. This means that when counting up, the counter will go from 1023 round to 0. This is practical if you are using the Trak-Ball to perform graphics operations as it exceeds the pixel resolution available on the BBC Micro.

However, if you want a larger wrap around number, just change lines 470 and 590 to larger values – powers of two minus one, of course.

Finally the X index register and the accumulator are restored to their original values and the program is sent on its way.

The Trak-Ball has one more trick up its sleeve – a small switch on the back labelled TB and JS. Everything described so far requires this switch to be in the TB (Trak-Ball) position.

If we move it to the JS (joystick) position we get completely different signals out of the beast. These are illustrated in Figure II.

The Trak-Ball then acts like a self-centring, switched joystick. When the ball is moving to the left, pin 3 goes from logic one to logic zero; when the ball stops moving it goes back to logic one.

The lines over the top of the labels in Figure II indicate that the condition of the name is true when the output is a zero. You would pronounce pin 3 as "not left". This is similar to a switched joystick but, as the signals are logic

→

From Page 119

levels and not switch contacts, the interface I described in the March 1983 edition of *The Micro User* will not work.

So, out with the soldering irons and let's see what will.

Figure III shows the circuit for the Trak-Ball interface used in the joystick mode. As you would only want this mode when playing games, we have to make something that plugs into the analogue port like any other joystick.

You can see that the circuit splits up into two identical parts, one for each direction. Let's just consider how the top half works.

Each transistor acts as a switch and can be thought of as being on or off. When T3 and T4 are off, the voltage at the analogue input (pin 7) is half the reference voltage, courtesy of resistors R5 and R6.

This is the case when there is no movement on the Trak-Ball, as signals from pins 1 and 2 will be high. These turn T1 and T2 on and so connect the bases of T3 and T4 to earth ensuring they are off.

Any up movement will cause pin 1 to

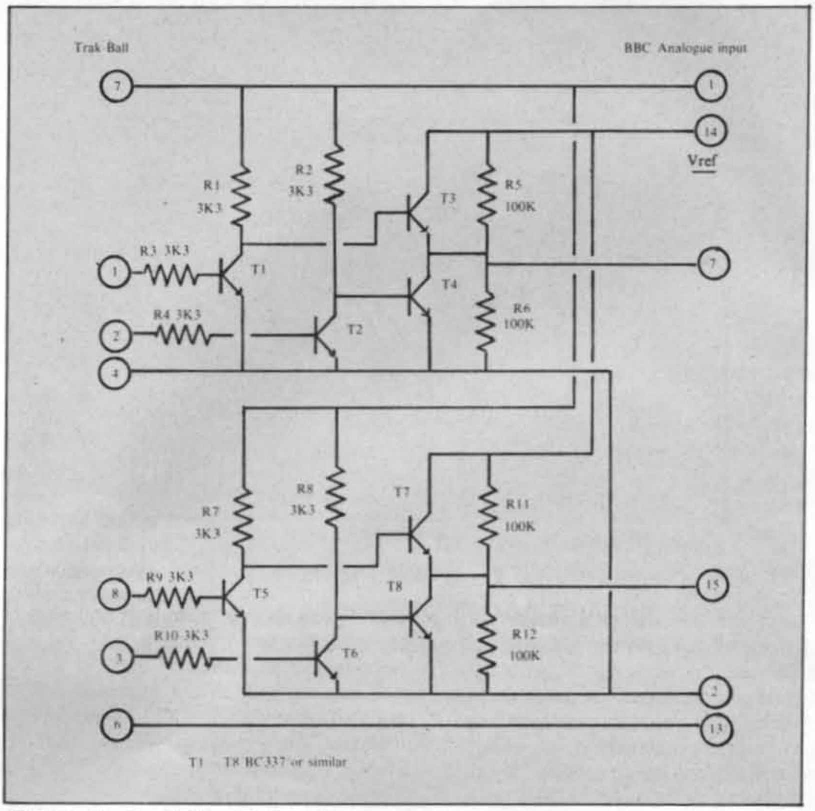

Figure III: Joystick mode interface

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go low thus turning off T1. This allows the voltage on its collector to rise and thus turns T3 on. As T3 is on, R5 is shorted out and so the analogue input goes to the maximum, the reference voltage.

Conversely if there is some down movement, T2 turns off which consequently turns T4 on. This shorts out R6 and connects the analogue input voltage to the minimum or zero volts.

As the Trak-Ball cannot move up and down simultaneously, T3 and T4 are never on at the same time. However if the Trak-Ball is unplugged from the interface circuit, then T3 and T4 will turn on together. This will short out the reference voltage to earth.

Don't panic. This is perfectly all right as it is generated from a high impedence source. The only effect will be that all analogue input channels will give a reading of zero.

A printed circuit is available along with a kit of parts for everything needed to make this interface. It is one of the simplest I have produced and is especially recommended for first time constructors.

All the component numbers are marked on the printed circuit board and there are only two different values of resistors to get in the wrong place. The interface is plugged directly into the user port and the Trak-Ball into the interface.

To order it see Page 181

With this fitted, you can then use the Trak-Ball on your favourite games. Remember, the effect of having your stick to one side is achieved when the ball is moving – a good trick if you can do it.

This means that it is especially suited for those games which require rapid side to side movement.

If longer periods of control are needed you have to resort to spinning the ball. It's quite easy but not what you are used to. I had a go using the excellent Fortress from Pace and I found I had to spin the ball to get over the first wall and then the delicate control paid off.

I don't get very far, but then I never could. Nevertheless, I get further than I used to.

The old favourite, Acornsoft's Rocket Raid was also quite successful using the Trak-Ball. Remember in this mode you are emulating a self-centring switch joystick and so it is useless for games like Aviator – that's what last month's circuit was about.

Well, having spent three months on joystick applications for the analogue input port, next month tune in, as they say, for something completely different.

```
   10 REM TRACK BALL SOFTWARE PATCH
   20 REM By Mike Cook
   30 CODE%=&A00
   40 FOR A=0 TO 3 STEP 3
   50 VECT=&74
   60 P%=CODE%
   70 [
   80 OPT A
   90 PHA \SAVE ACC
  100 TXA
  110 PHA \SAVE X REG
  120 LDA &FE6D \ INTERRUPT FLAG REG
  130 AND #&18 \ SEE IF IT IS CB1 OR
CB2
  140 BEQ NUS \ BRANCH IF ITS NOT US
THE IRQ WANTS
  150 PHA \SAVE INTERRUPT FLAGS FOR L
ATER
  160 AND #&8 \ TEST FOR HORIZONTAL
  170 BEQ VERT \ IF NOT LOOK AT VERTI
CAL
  180 LDA &FE60 \ SEE WHICH DIRECTION
  190 LDX #0
  200 ROR A \ GET DIRECTION INTO CARR
Y
  210 BCC SK1
  220 JSR UP
  230 JMP VERT
  240 .SK1 JSR DOWN \ DECREMENT COUNT
  250 .VERT \ LOOK FOR VERTICAL CHANG
E
  260 LDX #2
  270 PLA \ RECOVER FLAGS
  280 AND #&10 \ LOOK FOR VERTICAL IN
TERRUPT
  290 BEQ NUS \BRANCH IF THERE IS NONE
  300 LDA &FE60 \ GET DIRECTION
  310 ROR A
  320 ROR A
  330 BCS SK2
  340 JSR UP
  350 JMP NUS
  360 .SK2 JSR DOWN
  370 .NUS PLA \ GET X FROM STACK
  380 TAX
  390 PLA
  400 JMP (VECT)
  410 .UP \ INCREMENT COUNTERS
  420 INC &70,X
  430 BNE COMP
  440 LDA &71,X
  450 CLC
  460 ADC #1
  470 AND #3
  480 STA &71,X
  490 .COMP RTS
  500 .DOWN \ DECREMENT COUNTERS
  510 CLC
  520 LDA &70,X
  530 SBC #0
  540 STA &70,X
  550 BCS COMP
  560 LDA &71,X
  570 CLC
  580 SBC #0
  590 AND #3
  600 STA &71,X
  610 RTS
  620 ]
  630 NEXT
  640 CLS
  650 PRINT
  660 PRINT"BEEB BODY BUILD"
  670 PRINT"Feb 1985"
  680 PRINT"By Mike Cook"
  690 PRINT
  700 PRINT"Trak-Ball software patch"
  710 PROC_VECTOR_SWAP
  720 ?&FE62=?&FE62 OR &FC
  730 ?&FE6C=?&FE6C AND 15 : REM NEGA
TIVE EDGE FOR CB1 & CB2
  740 ?&FE6E=&98 : REM ENABLE INTERRU
PTS
  750 !&70=0
  760 *KEY0 P."X IS ";(?&70+(?&71)*25
6)|M
  770 *KEY1 P."Y IS ";(?&72+(?&73)*25
6)|M
  780 REPEAT
  790 A%=?&70+(?&71)*256
  800 B%=?&72+(?&73)*256
  810 PRINT TAB(0,10);"CO-ORDNIATES A
RE ";A%;"   ";B%
  820 UNTIL FALSE
  830 END
  840 DEF PROC_VECTOR_SWAP
  850 PRINT"INSTALLING VECTOR PATCH"
  860 ?VECT=?&206
  870 ?(VECT+1)=?&207
  880 ?&206=CODE% MOD 256
  890 ?&207=CODE% DIV 256
  900 ENDPROC
```

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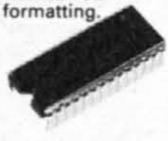

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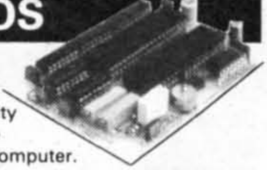

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Take a Pilot aboard and go full steam ahead with your quizzes

By GORDON MILLS

CHUCK Carpenter published a version of a Pilot interpreter written in Basic for the Apple II which he had modified from a public domain Pilot program of N. Dealey. I re-wrote and extended this version which was published in *Apple User* in September 1984.

It is rather surprising that no version of Pilot seems to be available for the BBC Micro despite the fact that the Pilot language was originally written for teachers to help them produce computer-aided learning programs.

Perhaps one reason for this is that the "super" Pilot such as that available on the Apple is even more complicated to learn than Basic.

One advantage of a simple Pilot is that beginners in programming can be more easily initiated into the techniques of simple program structures. The disadvantages are that it does not allow subroutines/procedures nor any form of mathematical calculation.

However, for the teacher who wishes to make up simple quizzes or tutorial material on a question/response basis, this simple Pilot may save considerable time when compared with a similar program written in Basic.

The version described here is based on the Apple version (lines 500-4900 are identical), which is why GOSUBs are used instead of PROCedures. It requires only a few simple command letters with each command followed by a colon, as shown in Table I.

After typing in Program II this should be saved. On running the program, to write a new one press 1 (new program). Then enter the name which you wish to give it. After a few seconds, a zero followed by a question mark will appear.

This is your cue to start typing in Pilot. It is important not to put in unnecessary spaces.

The text command T: can be used to put any normal keyboard character on screen. Crude graphics can be displayed by using *, + and a full-stop to build patterns spread over a number of lines.

T:	Text line.
A:	Accept user input.
M:	List of strings to check if there is a Match with the last user input.
J:	Jump to another line.
C:	Clear the screen.
R:	Remark or comment line.
E:	(or END:) End the Pilot program.
S:	Allows a score to be kept (that is requires a number).
DONE	To end writing a program and return to menu.

Table I: Table of commands

All the main commands can be modified by Y or N immediately following the command symbols and before the colon. This causes the command to operate only if:

The modifier is Y and the last Match is positive,

Or:

The modifier is N and the last Match is negative.

Additional symbols used are * to precede labels of lines to which the programmer wishes to jump and S to precede string labels in lines accepting user input. These can be used later in the program in text lines.

Examples of their use are given in Program I and in the instructions contained within Program II.

When using the Match command more than one string can be checked providing each is separated by a comma. Note also that the last symbol on a Match line must always be a single quote (').

As there is a limitation of 33 characters per line, if the number of matches to be checked is greater than can be accommodated on one line, then the continuation Match lines must start with MN: as shown in line 6 of Program I.

Apart from improving the integrity and structure of the Carpenter program, additional features include:

- ● A comprehensive menu. On running the program, press 1 to start a new program. All other commands are self-explanatory.
- ● Improved editing by allowing the insertion and deletion of lines in a Pilot program.
- ● An option for the Pilot program to be listed on a printer.
- ● Paged screen listing of the Pilot program.
- ● Maximum number of Pilot program lines is 400. This could be enlarged further if required by increasing the value of MX in line 130. Alternatively, initialising/editing delays could be reduced by decreasing MX.
- ● Instructions and commands together with a sample Pilot program included within the Basic program.
- ● The addition of a Score command, S: which can be followed by any number (positive or negative). If the Score number is less than 999, than that number is added to the current score: if 999 or greater, the score is reset to zero. At the conclusion of the program, the score is printed out.
- ● A facility for Pilot programs to be saved to and loaded from either cassette or disc.

When writing or editing a program, to tell the micro that you have finished type DONE on the next line (without a colon) and you will be returned to the

→

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menu. Don't forget that you will need the command E: to end the program you are writing.

One of the simplest uses for Pilot in education is to present simple knowledge tests. Program I is intended to illustrate how program structures can be developed from the simple to the more complex, thereby providing an ideal teaching medium for beginners.

Question 1 allows one attempt only. Question 2 shows how a multiple choice question can be written.

Questions 3 and 4 allow the user any number of attempts but it is important to include, as in Question 4, the option (?) to escape from what would be an endless loop if the answer is not automatically given after the user response.

Question 5 shows how to obtain two answers from one question. This involves a much more complex structure than the previous questions. The five types of questions demonstrated in Program I can serve as a model for similar questions in any discipline.

This Mini Pilot interpreter, although written in Basic, is surprisingly fast. The only delays – of several seconds – occur on initialising (including when loading from disc), and when inserting blank lines or deleting lines (under EDIT).

Also, the modular construction allows the expert programmer to readily experiment with additional commands if desired.

Now is your chance to experiment with a simplified Pilot. It may be that more elaborate versions are on the way, but this is a cheap method of finding out whether you think a more expensive Pilot with graphics and mathematical facilities could be a worthwhile acquisition.

I hope you and your friends – or pupils – don't groan too much at the riddles in Program I.

Pilot listing

PROGRAM I

```
  0*1
  1C:
  2T:IF AN INDIAN WOMAN IS A SQUAW
  3T:WHAT IS AN INDIAN BABY?
  4A:
  5M:PAPOOSE,PAPPOOSE,PAPPOOS,'
  6MN:SQUAWKER,'
  7SY:3
  8TY:GOOD
  9T:THE JOKE ANSWER IS SQUAWKER
 10T:NOW PRESS RETURN
 11A:
 12*2
 13C:
 14T:HOW MANY KINGS HAVE BEEN
 15T:CROWNED IN ENGLAND SINCE
 16T:1500 AD ?
 17T:
 18T:A - ONE
 19T:B - 15
 20T:C - 16
 21T:
 22T:TYPE A OR B OR C
 23A:
 24M:A,'
 25TN:ANSWER A IS CORRECT BECAUSE
 26T:ONLY JAMES I WAS ALREADY KING!
 27SY:2
 28SN:-1
 29T:PRESS RETURN
 30A:
 31*3
 32C:
 33T:WHAT WAS THE LARGEST ISLAND
 34T:BEFORE AUSTRALIA WAS
 35T:DISCOVERED ?
 36A: $ANSWER
 37M:AUSTRALIA,'
 38TN: $ANSWER IS WRONG
 39SN:-1
 40T:CORRECT IS STILL AUSTRALIA!
 41SY:3
 42TN:NOW PRESS RETURN
 43AN:
 44JN:*3
 45T:GOOD. NOW PRESS RETURN
 46A:
 47*4
 48C:
 49T:IF YOU REALLY DON'T KNOW THE
 50T:ANSWER TO THE NEXT QUESTION,
 51T:TYPE ?
 52*4A
 53T:MAKE ONE WORD FROM THE LETTERS
 54T:NEW DOOR
 55A:
 56M:ONE WORD,ONEWORD,'
 57TY:GOOD. NOW PRESS RETURN
 58AY:
 59SY:3
 60JY:*5
 61M:?,'
 62SY:-1
 63SN:-2
 64TN:TRY AGAIN. PRESS RETURN
 65AN:
 66JN:*4
 67TY:THE ANSWER IS THE 2ND AND 3RD
 68TY:WORDS OF THE RIDDLE!
 69TY:PRESS RETURN
 70A:
 71C:
 72JY:*4A
 73*5
 74R:A QUESTION WITH TWO ANSWERS
 75C:
 76T:WHAT CAN BE ADDED TO NINE TO
 77T:MAKE SIX ?
 78T:TYPE ONE OF TWO POSSIBLE
 79T:ANSWERS
 80A:
 81M:-3,- 3,MINUS3,MINUS 3,'
 82SY:1
 83JN:*5A
 84T:GOOD. NOW TYPE ANOTHER
 85A:
 86M:S,'
 87JN:*5B
 88*5C
 89SY:2
 90T:EXCELLENT. MAX SCORE IS 14
 91T:PRESS RETURN TO FIND YOURS
 92A:
 93EY:
 94*5B
 95T:CORRECT IS S. (S + IX = SIX)
 96*5D
 97SN:-2
 98T:PRESS RETURN
 99A:
100J:*5
101*5A
102M:S,'
103SN:-2
104SY:1
105TN:TRY AGAIN
106JN:*5
107T:GOOD. WHAT IS THE OTHER ?
108A:
109M:-3,- 3,MINUS3,MINUS 3,'
110JY:*5C
111T:CORRECT IS -3 (MINUS 3)
112J:*5D
```

PROGRAM II

```
  10REM MINI PILOT
  20REM (c) MICRO USER
 100REM INITIALIZE
 110@%=3
 120D0$=":":D1$=",":CP$="":M$="N"
 130MX=399:LL=33:R=19:JF=0:LF=7:NL=20
:Q=0:SC=0
 140DIMP$(1,MX),I$(1,R),S$(7),M$(9)
 150S$="AAAAAAAAAAAAAAAAAAAAAAAAAAAA
```

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Pilot listing

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```
AAAAAA":A$=S$
 200REMDATA
 210FORI=1TO9:READ M$(I):NEXT
 220DATANEW PROGRAM,LIST,EDIT,RUN,REP
LACE,SAVE,LOAD,END,INSTRUCTIONS
 230FORI=1TO7:READS$(I):NEXT
 240DATAA,T,M,J,C,E,S
 499REMCONTROL SECTION
 500GOSUB1000:GOTO600
 510GOSUB1100:GOTO600
 520GOSUB1200:GOTO600
 530GOSUB1300:GOTO600
 540GOSUB1400:GOTO600
 550GOSUB1500:GOTO600
 560GOSUB1600:GOTO600
 570GOSUB1700:GOTO600
 580GOSUB1800:GOTO600
 590GOSUB1900:GOTO600
 600ON Z GOTO510,520,530,540,550,560,
570,580,590,500
 999REMTITLE
 1000GOSUB5000:V=1:H=1:GOSUB5200:GOSUB
4900
 1010V=2:H=9:GOSUB5200:PRINT"MINI-PILO
T (GMM)"
 1020V=3:H=1:GOSUB5200:GOSUB4900
 1030FORI=1TO9:V=4+I:H=10:GOSUB5200:PR
INTI
 1040H=14:GOSUB5200:PRINTM$(I):NEXT
 1050V=23:H=1:GOSUB5200:PRINT"PRESS NU
MBER OF ITEM REQUIRED";
 1060GOSUB6000:IFG<49 ORG>57 THEN1060
 1070Z=VAL(A$):RETURN
 1100REMNEW
 1105LT=LL:Z=1:V=1:H=1:IFA$="EDIT"THEN
V=3:GOTO1125
 1110CP$="":GOSUB5000:C=0:GOSUB5200:PR
INT"PROGRAM NAME? ";:LL=LF:GOSUB6100
 1115CP$=A$:IFCP$=""THEN1110
 1120LL=LT:GOSUB4500
 1125V=V+1:FORA=C TO MX:GOSUB4800:IFA=
MX THENGOSUB4300
 1130PRINTA;"?";:GOSUB6100
 1135IFA$="EDIT"THENZ=3:A=MX:GOTO1175
 1140IFA$="DONE"THENZ=10:A=MX:GOTO1175
 1145IFLEFT$(A$,1)="*"ORLEFT$(A$,1)="!
"THENP$(0,A)="":P$(1,A)=A$:GOTO1175
 1150M=0:FORB=1TO LEN(A$)
 1155IFMID$(A$,B,1)<>D0$ THEN1165
 1160P$(0,A)=LEFT$(A$,B-1):P$(1,A)=MID
$(A$,B+1,LEN(A$)-B+2):B=LEN(A$):M=1
 1165NEXTB:IF M THEN1175
 1170V=V+1:GOSUB5200:PRINT"COMMAND ERR
OR":A=A-1:V=V+1:GOSUB5200
 1175NEXTA:RETURN
 1200REMLIST
 1205Z=10:IFCP$=""THENRETURN
 1210GOSUB5000:PRINT"PRESS S FOR SCREE
N/P FOR PRINTER";
 1215GOSUB6000:IFG<>80 ANDG<>83 THEN12
15
 1220GOSUB5000:IFG=80THENGOSUB6500
 1225V=1:H=8:GOSUB5200:PRINTCP$:NC=0:F
ORA=0 TO MX:NC=NC+1
 1230IFP$(0,A)=""ANDP$(1,A)=""THENA=MX
:GOTO1255
 1235GOSUB4800:H=1:GOSUB5200
 1240IFP$(0,A)<>""THENPRINTA;:H=4:GOSU
B5200:PRINTP$(0,A);D0$;P$(1,A):GOTO125
0
 1245PRINTA;:H=4:GOSUB5200:PRINTP$(1,A
)
 1250IFG<>80THENGOSUB4600
 1255NEXTA:GOSUB6600:GOSUB4700:RETURN
 1300REMEDIT
 1310GOSUB5000:PRINT"PRESS I TO INSERT
":PRINT:PRINT:PRINT"OR A TO ALTER/ADD"
 1320PRINT:PRINT"OR D TO DELETE MORE T
HAN ONE LINE"
 1325PRINT:PRINT"OR R TO RENAME PILOT
PROGRAM"
 1330GOSUB6000:IFG<>73 AND G<>68 AND G
<>65 AND G<>82 THEN1330
 1335IFG=68 THEN GOSUB4400:GOTO1390
 1340IFG=65 THEN GOSUB4400:GOTO1380
 1345IFG=73 THEN GOSUB4400:GOTO1360
 1350GOSUB5000:PRINT"TO REPLACE ";CP$;
" TYPE: ":LT=LL:LL=LF:GOSUB6100:LL=LT
 1355CP$=A$:Z=10:RETURN
 1360PRINT:PRINT"NO. OF (BLANK) LINES
TO INSERT?"
 1365GOSUB6100:NB=VAL(A$):IFNB<1ORNB>(
MX-C)THENPRINT"INVALID":GOTO1365
 1370FORI=1TO MX-NB+1:FORI1=0TO1:P$(I1
,MX-I+1)=P$(I1,MX-I-NB+1):NEXTI1,I
 1375FORI=C TO C+NB-1:P$(0,I)="":P$(1,
I)="":NEXT
 1380GOSUB5000:IF C THENPRINTC-1;" ";P
$(0,C-1);D0$;P$(1,C-1)
 1385PRINTC;P$(0,C);D0$;P$(1,C):Z=1:A$
="EDIT":RETURN
 1390GOSUB5000:PRINT"DELETE FROM ";C;"
 TO ? ";:GOSUB6100
 1392ND=VAL(A$):IF ND<C+1 OR ND>MX THE
N1390
 1394FORI=C TO ND:P$(0,I)="":P$(1,I)="
":NEXT
 1396FORI=ND+1 TO MX:P$(0,I-ND-1+C)=P$
(0,I):P$(1,I-ND-1+C)=P$(1,I):NEXT:GOTO
1380
 1400REMRUN
 1410FORI=1TO R:FORP=0 TO 1:I$(P,I)=""
:NEXT:NEXT
 1420F=0:GOSUB5000
 1430PRINT:PRINT"RUN OF ";CP$:GOSUB700
0
 1440FORA=0 TO MX:IFLEN(P$(0,A))=2 AND
 RIGHT$(P$(0,A),1)<>M$THEN1470
 1450FORJ=1TO7:IFLEFT$(P$(0,A),1)=S$(J
)THEN ON J GOSUB3000,3100,3300,3400,35
00,3600,3700
 1460NEXT:IF Q THEN A=MX
 1470NEXTA:Q=0
 1480PRINT:PRINT:PRINT"END OF RUN":PRI
NT:IF SC THENPRINT"SCORE = ";SC
 1490SC=0:GOSUB4700:Z=10:RETURN
 1500REM REPLACE STORED PROGRAM
 1510Z=6:GOSUB6700:Z=10:RETURN
 1600REM SAVE DISK/CASSETTE
 1605 *DISK
 1610CLS:PRINT:PRINT"PRESS C TO SAVE O
N CASSETTE OR":PRINT"      D TO SAVE O
N DISK"
 1620GOSUB6000:IFA$<>"C" AND A$<>"D" T
HEN1620
 1630IFA$="D"THEN1650
 1640 *TAPE
 1650GOSUB6800:Z=10:RETURN
 1700REM LOAD
 1705 *DISK
 1710CLS:PRINT:PRINT"PRESS C TO LOAD F
ROM CASSETTE OR":PRINT"      D TO LOAD
 FROM DISK"
 1720GOSUB6000:IFA$<>"C" AND A$<>"D" T
HEN1720
 1730IFA$="D"THEN1760
 1740 *TAPE
 1750PRINT:PRINT"Searching":PRINT"PRES
S PLAY ON CASSETTE"
 1760GOSUB6900:Z=10:RETURN
 1800GOSUB5000:PRINT"BYE-BYE":END
 1900REMINSTRUCTIONS
 1910GOSUB5000:PRINT"T: TYPE WHATEVER
IS ON THIS LINE"
 1920V=2:H=4:GOSUB5200:PRINT"(MAX=";LL
;"CHARACTERS/LINE)"
 1930H=1:V=4:GOSUB5200:PRINT"A: WAIT F
OR USER INPUT"
 1940V=6:GOSUB5200:PRINT"M: MATCH CHAR
ACTERS WITH INPUT"
 1950H=4:V=7:GOSUB5200:PRINT"FROM A: (
, BETWEEN ITEMS AND"
 1955V=8:GOSUB5200:PRINT"END LINE WITH
 ')"
 1960H=1:V=10:GOSUB5200:PRINT"J: JUMP
TO LABEL (STARTING *)"
 1970V=12:GOSUB5200:PRINT"C: CLEAR THE
 SCREEN"
 1975V=13:GOSUB5200:PRINT"R: REMARK OR
 COMMENT"
```

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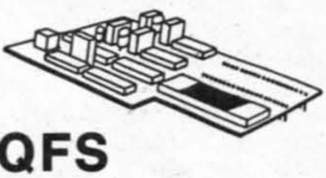

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From Page 127

```
 1980V=14:GOSUB5200:PRINT"S: + OR - NU
MBER TO ADD TO SCORE"
 1990GOSUB4700:Z=10
 2000GOSUB5000:PRINT"Y OR N ARE MODIFI
ERS AFTER MAIN"
 2010V=2:GOSUB5200:PRINT"COMMANDS (AND
 BEFORE :) TO GIVE"
 2020V=3:GOSUB5200:PRINT"ACTION IF THE
 LAST MATCH WAS"
 2030V=4:GOSUB5200:PRINT"CORRECT (Y) O
R INCORRECT (N)"
 2040V=6:GOSUB5200:PRINT"* IS USED BEF
ORE EACH LABEL"
 2050V=8:GOSUB5200:PRINT"$ MUST PRECED
E A STRING LABEL IN"
 2060V=9:GOSUB5200:PRINT"A: LINES IF I
T IS TO BE USED"
 2070V=10:GOSUB5200:PRINT"LATER IN (SA
Y) T: LINES"
 2080V=12:GOSUB5200:PRINT"E: OR END: S
TOPS THE PILOT RUN"
 2090V=14:GOSUB5200:PRINT"DONE IS USED
 TO END INPUT MODE"
 2100GOSUB4700
 2110GOSUB5000:PRINT"SAMPLE PROGRAM":P
RINT
 2120PRINT"  0?R:NAME INPUT":PRINT"  1
?*BEGIN":PRINT"  2?T:TYPE YOUR NAME"
 2130PRINT"  3?A: $NAME":PRINT"  4?M:S
UPERMAN,SUPERWOMAN,'"
 2140PRINT"  5?TY:DON'T BE FACETIOUS":
PRINT"  6?JY:*BEGIN"
 2150PRINT"  7?T:HELLO, $NAME":PRINT"
 8?END:"
 2160PRINT:PRINT"ALWAYS PUT A SPACE BE
FORE $":GOSUB4700:RETURN
 3000REMASK
 3010PRINT"     ";:P$=P$(1,A):L=LEN(P$)
:FORK=1TO L
 3020IFMID$(P$,K,1)<>"$"THEN3040
 3030I$(0,F)=MID$(P$,K):GOSUB6100:I$(1
,F)=A$:Z$=A$:F=F+1:K=L:NEXTK:RETURN
 3040NEXTK:GOSUB6100:Z$=A$:PRINT:RETUR
N
 3100REMTYPE
 3120P$=P$(1,A):L=LEN(P$):FORK=1TO L
 3130IFMID$(P$,K,1)="$"THEN3150
 3140NEXTK:GOSUB3220:RETURN
 3150FORU=K TO L+1
 3160IFMID$(P$,U,1)=" "ORMID$(P$,U,1)=
""THENY=U:U=L+1:NEXTU:GOTO3180
 3170NEXTU:K=L:NEXTK:GOSUB3220:RETURN
 3180U=Y:V$=MID$(P$,K,U-K)
 3190FORH=F-1 TO 0 STEP-1
 3200IFV$<>I$(0,H)THENNEXTH:GOTO3220
 3210PRINTMID$(P$,1,K-1);I$(1,H);MID$(
P$,U,L-U+1):H=0:NEXTH:K=L:NEXTK:RETURN
 3220PRINTP$:RETURN
 3300REMMATCH
 3310M$="N":N=1
 3320P$=P$(1,A):L=LEN(P$):FORE=1 TO L
 3330IFMID$(P$,E,1)<>D1$THEN3370
 3350IFMID$(P$,N,E-N)=Z$THENM$="Y":E=L
:GOTO3380
 3360N=E+1
 3370IFMID$(P$,E,2)=" "ORMID$(P$,E,1)=
""THENE=L
 3380NEXTE:RETURN
 3400REMJUMP
 3410Q=0:FOR D=0TO MX
 3420IFP$(0,D)<>""THEN3440
 3430IFMID$(P$(1,A),1,LL)=MID$(P$(1,D)
,1,LL)THENA=D:D=MX:NEXTD:RETURN
 3440NEXTD:V=V+1:GOSUB5200
 3450PRINT:PRINT"JUMP TO UNFOUND LABEL
 FROM LINE #";A:Q=1:V=V+1:RETURN
 3500REMCLEARSCREEN
 3510GOSUB5000:RETURN
 3600REMEND
 3610A=MX:RETURN
 3700REMSCORE
 3710TS=VAL(P$(1,A)):IF TS>998THENSC=0
:RETURN
 3720SC=SC+TS:RETURN
 4300GOSUB5000:PRINTMX;" IS THE LAST P
OSSIBLE LINE.":PRINT
 4310PRINT"DISK DRIVE USERS MAY CONTIN
UE":PRINT"BY SAVING THE PILOT PROGRAM"
 4320PRINT"AFTER INPUT OF THIS LINE ";
MX:PRINT:PRINT"THEN AMEND LINE 130 OF
THE"
 4330PRINT"PILOT INTERPRETER TO INCREA
SE":PRINT"THE VALUE OF 'MX' BEFORE REL
OAD"
 4340GOSUB4700:GOSUB5000:Z=10:RETURN
 4400GOSUB5000:PRINT"STARTING AT LINE
? ";:GOSUB6100:C=VAL(A$)
 4410IF(C<1 AND A$<>"0") OR C>MX THEN4
400
 4420RETURN
 4500FORA=0TOMX:P$(0,A)="":P$(1,A)="":
NEXT:RETURN
 4600REMPAGING LIST
 4610IFNC<NL THENRETURN
 4620NC=0:GOSUB4700:GOSUB5000:V=1:H=8:
GOSUB5200:PRINTCP$:RETURN
 4700REMPRESS SPACE BAR
 4710V=23:H=1:GOSUB5200:PRINT"PRESS SP
ACE BAR TO CONTINUE";
 4720GOSUB6000:IFG<>32THEN4720
 4730G=0:RETURN
 4800REMSET TABS FOR LINE NUMBERS
 4810V=V+1:H=1:IFA<100THENH=2
 4820IFA<10THENH=3
 4830GOSUB5200:RETURN
 4900FORI=1TOLL+5:PRINT"*";:NEXT:RETUR
N
 5000CLS:RETURN
 5200VDU31,H-1,V-1:RETURN
 6000A$=GET$:G=ASC(A$):RETURN
 6100REMINPUT CHECK
 6110S$=""
 6120GOSUB6000:X=ASC(A$)
 6130S=LEN(S$):IFX=127 AND S THENS$=LE
FT$(S$,S-1):PRINTA$;:GOTO6120
 6140IFX=127THEN6120
 6150IFX=13THENPRINT:A$=S$:RETURN
 6160IFX>31 ANDX<91 ANDS<LL THENS$=S$+
A$:PRINTA$;
 6170GOTO6120
 6500REM PRINTER ON
 6510PRINTCHR$(2):RETURN
 6600REM PRINTER OFF
 6610PRINTCHR$(3):RETURN
 6700REMREPLACEFILE
 6710GOSUB5000:PRINT"DO YOU WANT TO DE
LETE THE EXISTING FILE":PRINT:PRINT"OF
 "CP$" ?"
 6720PRINT:PRINT"PRESS Y OR N"
 6730GOSUB6000:IFG<>89 AND G<>78 THEN6
730
 6740IFG=78THENZ=10:RETURN
 6800REMDISKSAVE
 6810FORA=MX TO0STEP-1:IFP$(0,A)=""AND
P$(1,A)=""THENNEXT
 6820X=OPENOUT(CP$)
 6830FORI=0TOA
 6840PRINT#X,P$(0,I)
 6850PRINT#X,P$(1,I)
 6860NEXT
 6870CLOSE#X
 6880RETURN
 6900REMDISKLOAD
 6905GOSUB5000:INPUT"PROGRAM NAME? "CP
$:PRINT"WAIT":GOSUB4500
 6910Y=OPENIN(CP$)
 6915A=0
 6920REPEAT
 6930INPUT#Y,P$(0,A)
 6940INPUT#Y,P$(1,A)
 6950A=A+1
 6960UNTIL EOF#Y
 6970CLOSE#Y
 6980RETURN
 7000FORI=1 TO 2000:NEXT:RETURN
 8000END
```

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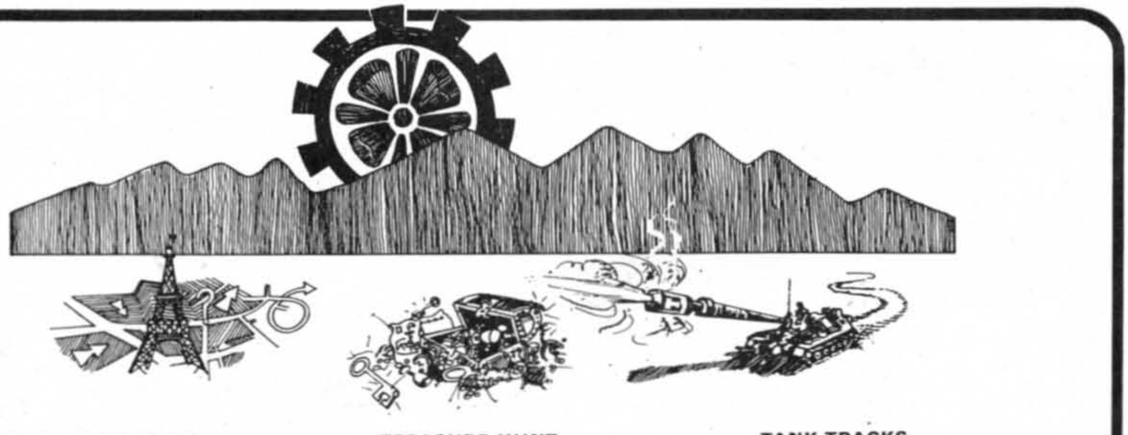

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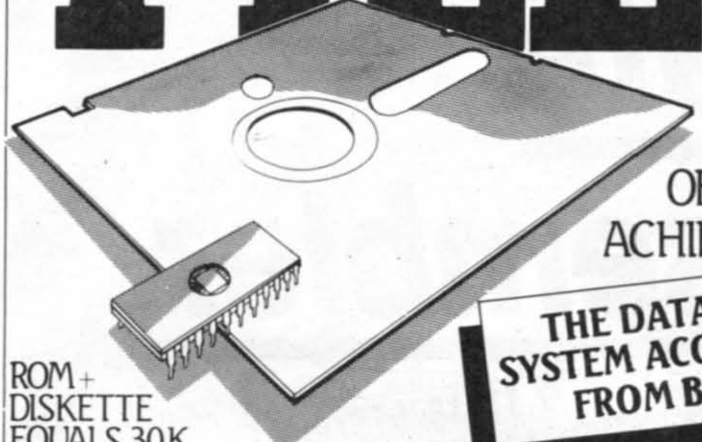

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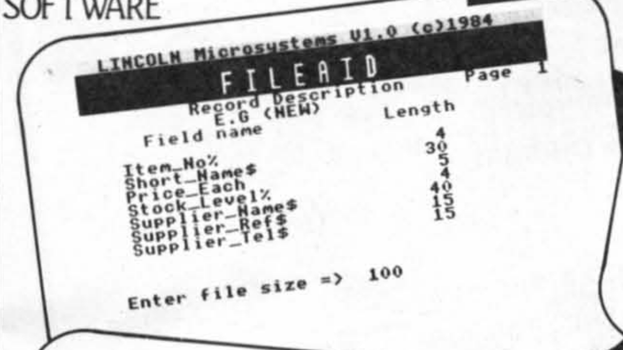
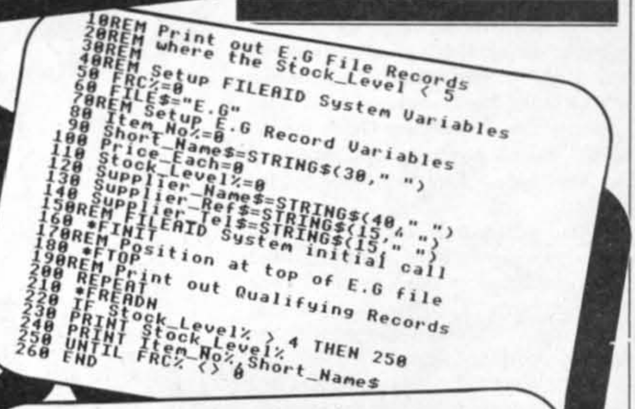
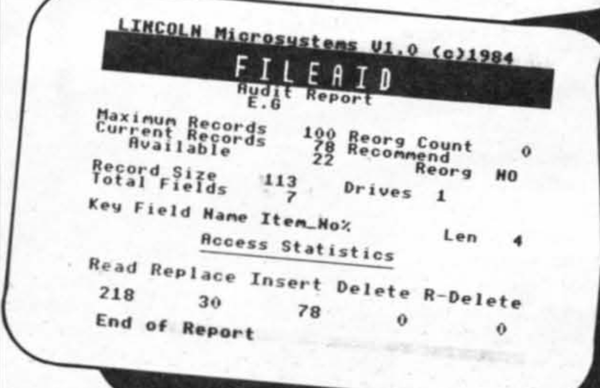


```
LINCOLN Microsystems V1.0 (c)1984
           FILEAID                Page  1
       Record Description
          E.G (NEW)          Length
   Field name
                                  4
                                 30
Item_No%                          5
Short_Name$                       4
Price_Each                       40
Stock_Level%                     15
Supplier_Name$                   15
Supplier_Ref$
Supplier_Tel$

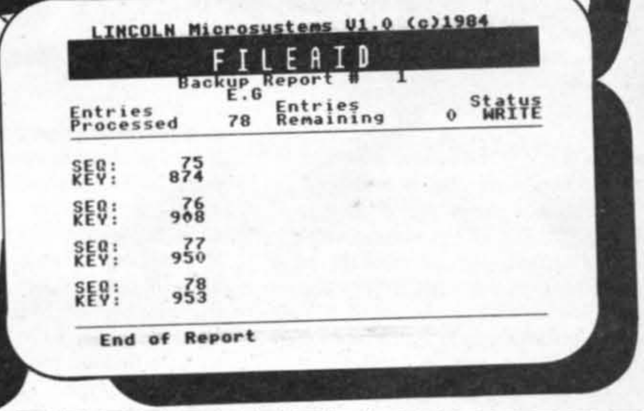

   Enter file size =>  100
```



```
10REM Print out E.G File Records
20REM where the Stock_Level < 5
30REM
40REM Setup FILEAID System Variables
50 FRC%=0
60 FILE$="E.G"
70REM Setup E.G Record Variables
80 Item_No%=0
90 Short_Name$=STRING$(30," ")
100 Price_Each=0
110 Stock_Level%=0
120 Supplier_Name$=STRING$(40," ")
130 Supplier_Ref$=STRING$(15," ")
140 Supplier_Tel$=STRING$(15," ")
150REM FILEAID System initial call
160 *FINIT
170REM Position at top of E.G file
180 *FTOP
190REM Print out Qualifying Records
200 REPEAT
210 *FREADN
220 IF Stock_Level% > 4 THEN 250
230 PRINT Stock_Level%
240 PRINT Item_No%,Short_Name$
250 UNTIL FRC% <> 0
260 END
```



```
LINCOLN Microsystems V1.0 (c)1984
            FILEAID
          Audit Report
             E.G
Maximum Records      100 Reorg Count
Current Records       78 Recommend         0
   Available          22
                                Reorg  NO
Record Size         113
Total Fields          7    Drives  1
Key Field Name Item_No%
                                Len   4
         Access Statistics
Read Replace Insert Delete R-Delete
 218    30      78      0        0
End of Report
```



```
LINCOLN Microsystems V1.0 (c)1984
            FILEAID
       Backup Report #  1
             E.G
Entries              Entries            Status
Processed       78   Remaining        0  WRITE

SEQ:      75
KEY:     874

SEQ:      76
KEY:     968

SEQ:      77
KEY:     950

SEQ:      78
KEY:     953

   End of Report
```

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DURING the long wait for my 6502 second processor I've occasionally been able to play with the editor's – when he wasn't looking. Having a strong sense of curiosity I wanted to know how the two processors communicated. Unfortunately the Acorn User Guide for the 6502 second processor was not very forthcoming, so I set out to find out for myself.

I had written a disassembler in Basic in the past *(Micro User,* April 1983) and have a number of other machine code disassemblers. The trouble was that none would work as I wanted with the second processor fitted.

What was needed was a program that would allow me to look at the memory of the second processor as well as the original micro, the input/output (I/O) processor.

This program can be used in two ways:

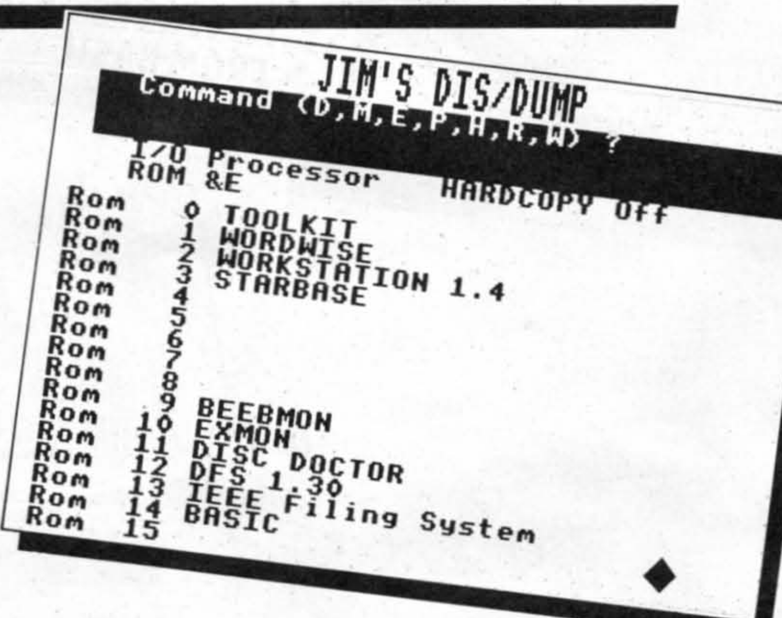
- If it is run in the second processor it will look at the memory of both the I/O processor and the second processor.
- If run in the I/O processor with no Tube attached – or not switched on – the contents of the paged ROMs can be examined as a list of the paged ROMs and their socket numbers produced. The commands are given in Table I.

The 6502 microprocessor is rich in its number of different addressing modes. If you've read the recent article on the extra commands offered by the new 65C02 in the second processor *(Micro User,* September 1984) you may want to add them to the opcode data table.

DISDUMP COMMANDS

P	Toggle between I/O + second processors.
H	Toggle between hardcopy on/off.
R	Input ROM number.
W	Which ROMs are present.
M	Memory dump.
D	Disassembler
E	Exit program.

Table I



```
JIM'S DIS/DUMP
Command (D,M,E,P,H,R,W) ?
I/O Processor   HARDCOPY Off
ROM &E
Rom    0 TOOLKIT
Rom    1 WORDWISE
Rom    2 WORKSTATION 1.4
Rom    3 STARBASE
Rom    4
Rom    5
Rom    6
Rom    7
Rom    8
Rom    9 BEEBMON
Rom   10 EXMON
Rom   11 DISC DOCTOR
Rom   12 DFS 1.30
Rom   13 IEEE Filing System
Rom   14 BASIC
Rom   15
```

Each piece of information contains the number of bytes following the opcode that are to be considered along with the opcode, the mnemonic and the addressing type. Table II gives the meaning for each addressing mode.

6502 MNEMONIC DECODING

0	implied	7	zero page,X
1	immediate	8	zero page,Y
2	absolute	9	accumulator
3	absolute, X	10	(indirect)
4	absolute, Y	11	(indirect,X)
5	relative	12	(indirect),Y
6	zero page		

Table II

In the disassembly, instead of merely printing the address of an operating system call the program prints out its name, making the calls much easier to recognise.

Not all these calls are documented by Acorn in the User Guide. See Table III and IV for these extra calls and vectors that are present in the I/O processor – they are not available across the Tube.

Running the program produces a colourful Mode 7 display. The program is now in command mode (the commands are listed in Table I). To select a command simply press the command letter.

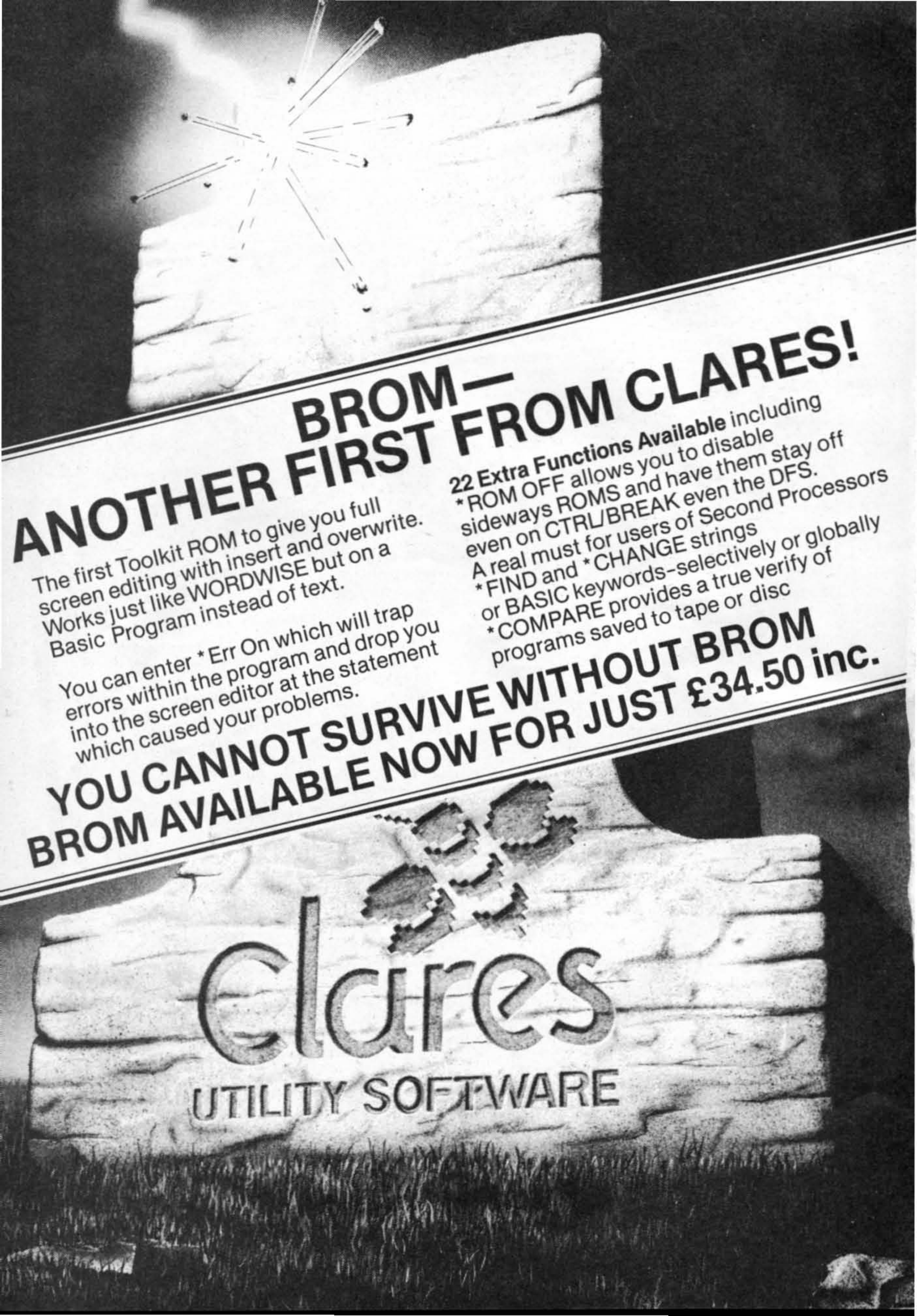
The D and M commands will ask you the memory start address to be used for the operation – D to disassemble and M to dump the memory contents.

The start address should be entered as a hexadecimal number without the & sign. Invalid numbers will default the

→

PROGRAM OPERATION

30	Selects the teletext mode because it uses up least memory.
40	Initialises variables and fills an array with data for disassembling machine code.
50-70	Prints a double height program title..
80	Error trapping. Printer disabled and text window reset. PROCerror not called if the Escape key pressed or there is no error.
90	Starts main loop.
100	Resets to default text window.
110	Blanks the lines used for inputs and error messages.
120-140	Prints whether hardcopy on or off and whether second or I/O processor active.
150-170	Get command. This method ensures that the program responds to both upper and lower case letters.
180-230	Selects correct option.
240	Blanks the input area.
250-260	Gets the start address in hexadecimal. (Omitting the & from the EVAL statement allows decimal values to be input instead).
270	Gives a default start address if the given address is out of range.
280-300	Gets an end address if output is to go to the printer.
310	Calls the procedure to define a text window to protect the upper part of the screen from scrolling.
320-330	Selects disassembly or memory dump options.
370-380	Dimension array and read the disassembly information into it.
390	Sets print columns to be 3 characters wide.
400	String used to blank out the input area at the top of the screen.
420	Reads presence of the Tube.
430	Reads currently selected ROM number.
440-450	Sets information flags.
470-510	Simple error reporting routine.
520	Blanks out lines 3 and 4.
540	Defines a text window to protect command area against the effects of scrolling. Also enables the printer if the hard copy flag is set.
580	Toggles between hardcopy on and off.
610	Checks program not in second processor.
620-670	Gets new ROM number, ensuring it is in range. Ignores any change if Return pressed.
690	You can't select a second processor if it's not fitted!
700	Toggles between I/O and second processor.
760	Checks program not in second processor.
780-900	Printout ROM title from location &8009. This will print paged ROM titles which conform to the format recommended by Acorn. Unfortunately not all software writers do!
920	If the Tube is present and you're looking at the memory of the second processor use byte indirection to return a value.
930	If there is no Tube connection use FNrom to return a value.
940-970	If the Tube is present but you're looking at the memory of the I/O processor use OSWORD 5 to return a value.
990-1010	This routine depends on a call undocumented by Acorn. It can only be used in the I/O processor.
1020	Entry to disassembler.
1040	The value of the location found by FNlook is used to put disassembly data into info$.
1050	byte% will contain the number of bytes (if any) that are to be included in the current command.
1060	op$ is the mnemonic of the current instruction (op code).
1070	type% gives the addressing mode of the current command (see Table II).
1080	Prints the current address in hex.
1090-1110	Print the hex value of the op code and associated bytes.
1130	Prints the op code.
1140+	Selects the appropriate routine for the ...
1200-1310	6502 addressing mode.
1330-1350	Handles immediate addressing by printing the hex value preceded by #& then ...
1340	Prints the binary bit pattern.
1350	If it's a printable Ascii character then print it.
1380-1410	Deals with absolute addressing.
1390-1400	If the address indicated is an operating system call or an operating system vector GOTO the routine which will print a name rather than an address.
1440-1450	Deals with X indexed addressing.
1480-1490	Deals with Y indexed addressing.
1520-1550	Works out relative address.
1580	Zero page addressing.
1610-1620	X indexed zero page addressing.
1650-1660	Y indexed zero page addressing.
1690	Accumulator addressing.
1720-1730	Indirect addressing.
1760	X register pre-indexed indirect addressing.
1790	Y register post-indexed indirect addressing.
1820-1850	Looks at each bit of a number in turn to print out the binary bit pattern of a number as a series of 0s + 1s.
1880	Changes the data pointer depending on whether it is an OS call or an OS vector.
1890	Sets a flag to indicate that an address has not been found.
1900	Reads through the data until that section of the data has been read or the required address is found and the corresponding name printed.
1920	If the address is not found, print it.
1950	Entry to memory dump routine.
1960	Prints current address in hexadecimal.
1970-1990	Prints hex value of memory locations pointed to.
2010-2040	Prints the Ascii character or '.' if it is a control character.
2100-2410	Data table for disassembly information.
2420-2520	Data table for OS calls (see Table III for calls undocumented in the User Guide).
2530-2650	Data table of OS vectors (see Table IV).



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The first Toolkit ROM to give you full screen editing with insert and overwrite. Works just like WORDWISE but on a Basic Program instead of text.

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ENHANCED **BETA-BASE £25 DISC 8 GREAT FEATURES**

WHAT IS A DATABASE?

It is a FILE which contains RECORDS. Records consist of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file. Each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access—disc based, single or dual drives
2) File Size—99K (40 track), 199K (80 track) —65,000 + records
3) Record Size—up to 2048 characters and 200 fields
4) Field Size—up to 254 characters with complete line scanning
5) Access any record using Primary Key in 2 seconds
6) Holds—1200 NAMES AND ADDRESS records on 100K disk
7) Search—500 records on 5 fields in 60 seconds
8) Sort—500 records on 3 fields in 60 seconds

SYSTEM FEATURES

- CALCULATE—using any valid expression and store results
- POWERFUL PRINTOUT OPTION—Eliminates need for separate mailing program, Parallel/Serial Printout allows setting of printer control codes, line spacing, tabulation, Headings etc, plus label printing with horizontal and vertical tab control.
- REDEFINE—Titles, field widths, number of fields, number of records etc.
- TRANSFER—Records from one file to another.
- SEARCH LISTS—Allow creation of sub-Databases within main Database.

NEW ✱

✱ GLOBALENTRY enables repetitive data to be typed in once and placed in as many records as required. Can also be used with a search list to provide a powerful global edit/update facility that will save hours of typing.

✱ SPOOLER enables you to create spooled files that are compatible with Wordwise, View and other word processors. You can therefore present your data within a document or in varying formats etc. The spooler program will allow to format your spooled file in the same way as the print out option. You can therefore have headings, columns, titles, numbers etc.

✱ INPUT is a routine included on the disc which will allow you to write utilities for accessing your data and tailored specifically to your needs.

✱ TUBE compatible with the 6502 second processor.

✱ Comprehensive manual and tutorial. All timings and sizes are relative to ACORN DFS. Compatible with ACORN DFS, WATFORD 1.3 and latest AMCOM DFS SERIES B.

✱ ORIGINAL USERS send your disc plus £3 for up grade.

REPLICA II: £12.00. DISC

The original REPLICA set a very high standard so the specification we set our chief programmer included some impossible features. In fact ACORN state that some of the things that we have done are impossible, it just took us longer that's all. REPLICA II transfers most cassette based programs to disk, even more than REPLICA. When you buy disk drives you do not have to throw away expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &EOO, those with up to 6 sections and those up to &6E in length eg adventure programs. No waiting for 6 minutes whilst adventure programs load.

REPLICA II is very easy to use. The user enters a name, how many sections and whether CHAIN,*RUN or *LOAD to load the first section. Press play and let the program do the rest, even a menu.

Think how much it will cost you to buy just 1 disk version of your favourite program—REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

FX 80 PRINTER DRIVER £12.00

PRINTER DRIVER FOR EPSON FX80 AND VIEW

Multi-page driver with print menu allowing the setting of global (document wide) printer functions at printer initialisation.

The print menu program contains a sophisticated character generator which allows the construction of 95 user defined characters which are then accessible from VIEW via a highlight option.

Supplied on disc with comprehensive user manual.

NEW **DISCDEX: £15.00 DISC**

- Catalogues all your discs quickly and easily.
- Room to store four thousand titles.
- Quick search and load option.
- Compatible with single or dual drives.
- Extensive print options for catalogue and disc labels.
- Update and delete options.
- Supplied with stick on labels to number your discs and a supply of labels for printing your own disc labels.

DISCDEX is the answer to a disc users nightmare. How many times have you had to wade through your discs looking for the file that you know is there somewhere? Now with DISCDEX those days are gone.

DISCDEX will catalogue all your discs and store them in alphabetic order. In addition to the very useful search and load facility DISCDEX will also print out a full catalogue in alphabetic or disc order. Even more useful is the ability to print disc labels for sticking on the disc or the jacket.

DISCDEX is only suitable for discs with 31 file names as in the standard ACORN system. It is not suitable for double density interfaces.

NEW **ONESHOT: £12.00 DISC**

- Full feature trace utility.
- Single step through BASIC program or halt at user determined interval.
- Print line number prior to execution.
- Obey fixed instructions before executing a line.
- Trace window allows screen to be seen whilst tracing execution.
- "Printer only" will force trace output to a printer allowing full screen display.
- Ability to dynamically alter control of ONESHOT.
- ONESHOT can be configured to run in any area of memory.

ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.

A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%¦ M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity. In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value. ONESHOT is not compatible with double density interfaces.

NEW **FUN HOUSE: £10.00 DISC**

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

FUN HOUSE is not compatible with double density interfaces.

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start address to 0.

If the printer has been selected you will also be asked for an end address for the operation.

P simply toggles between the I/O processor and the second processor's memory block. The second processor can only be selected if the Tube is present and turned on.

H toggles the hardcopy on/off. If the hard copy is on the output will be to the printer, otherwise all output will be to the screen.

R allows any of the paged ROMs to be selected for disassembling or dumping. If selected, the ROM socket number required should be entered as a decimal number between 0 and 15.

Selecting W will display the ROM titles of all the ROMs in the micro along with their socket numbers. Finally, the E command will exit the program and return to Basic command mode.

Pressing Escape at any time will return you to command mode.

OS CALLS

Not documented in User Guide.
Available only in I/O processor.

&FFB9 OSRROM	Read a byte of memory in paged ROM.
&FFBF OSEVEN	Generate an event.
&FFC2 GSINIT	General string routine initialise.
&FFC5 GSREAD	Read character from string.
&FFC8 NVWRCH	Non vectored OSWRCH.
&FFCB NVRDCH	Non vectored OSRDCH.

Table III

OS VECTORS

Not documented in User Guide.
Available only in I/O processor.

(&224) NETV	Econet vector.
(&226) VDUV	Unrecognised VDU command vector.
(&228) KEYBV	Keyboard vector.
(&22A) INSV	Insert byte into buffer vector.
(&22C) REMV	Remove byte from buffer vector.
(&22E) CRESV	Count/reset count of buffer vector.

Table IV

Disassembler listing

```
   10 REM Disdump (c) The Micro User
   20 REM By Jim Notman
   30 MODE7
   40 PROCinit
   50 FORI%=0TO1
   60 VDU31,0,I%,132,157,131,141:PRIN
TSPC(8)"JIM'S DIS/DUMP"
   70 NEXT
   80 ONERRORVDU3,26:IFERR<>17ANDERR<
>0THENPROCerror
   90 REPEAT
  100 VDU26
  110 PROCblank
  120 VDU31,0,5,132,157,134:PRINT;pro
c$;" Processor   HARDCOPY ";hard$;
  130 VDU31,0,6,132,157,134
  140 IF sec%=FALSE AND tube%=FALSE T
HEN PRINT"ROM";CHR$(131);"&";~rom ELS
E PRINT"       "
  150 PRINTTAB(0,2)CHR$(32)CHR$(157)C
HR$(129)"Command (D,M,E,P,H,R,W) ?";
  160 opt=INSTR("EePpHhRrWwMmDd",GET$
)
  170 opt=(opt+1)DIV2
  180 IFopt<1ORopt>7THEN160
  190 IFopt=1THEN@%=&A0A:VDU12:END
  200 IFopt=3THENPROChard:GOTO340
  210 IFopt=2THENPROCsec:GOTO340
  220 IFopt=4THENPROCrom:GOTO340
  230 IFopt=5THENPROCwhat:GOTO340
  240 PROCblank
  250 INPUTTAB(3,3)"Start  &"addr$
  260 addr%=EVAL("&"+addr$)
  270 IFaddr%<0ORaddr%>&FFFFTHENaddr%
=0
  280 IFhard%THENINPUTTAB(3,4)"Finish
 &"addr$ELSEaddr$="FFFF"
  290 end%=EVAL("&"+addr$)
  300 IFend%<=addr%THENPRINTTAB(18,4)
"That's silly":delay=INKEY(500):GOTO1
10
  310 PROCsetup
  320 IFopt=6THENPROCdump:GOTO340
  330 IFopt=7THENPROCdis
  340 UNTILFALSE
  350 END
  360 DEFPROCinit
  370 DIMD$(255)
  380 FORI%=0TO255:READD$(I%):NEXT
  390 @%=&303
  400 blank$=CHR$134+CHR$157+CHR$132+
STRING$(34," ")
  410 X%=0:Y%=&FF
  420 A%=&EA:tube%=((USR&FFF4)AND&FFF
F)DIV256
  430 A%=&FC:rom=((USR&FFF4)AND&FFFF)
DIV256
  440 IFtube%THENproc$="2nd":sec%=TRU
EELSEproc$="I/O":sec%=FALSE
  450 hard$="Off":hard%=FALSE
  460 ENDPROC
  470 DEFPROCerror
  480 VDU31,3,2,7:REPORT:PRINT" at li
ne ";ERL
  490 PRINTTAB(3,4)"PRESS 'space' to
continue";
  500 REPEAT:UNTILGET=32
  510 ENDPROC
  520 DEFPROCblank:PRINTTAB(0,3)blank
$:PRINTTAB(0,4)blank$:ENDPROC
  530 DEFPROCsetup
  540 VDU28,0,24,39,8,12
  550 IFhard%THENVDU2,15ELSEVDU3,14
  560 ENDPROC
  570 DEFPROChard
  580 IFhard%=FALSETHENhard%=TRUE:har
d$="On "ELSEhard%=FALSE:hard$="Off"
  590 ENDPROC
  600 DEFPROCrom
  610 IFtube%ORsec%THENPROCcannot:END
PROC
  620 REPEAT
  630 PROCblank
  640 INPUTTAB(3,3)"Rom no. "rom$:IFr
om$=""THEN660
  650 rom=EVAL(rom$)
  660 UNTILrom<16ORrom$=""
  670 ENDPROC
  680 DEFPROCsec
  690 IFNOTtube%AND&FFTHENVDU7:PRINTT
AB(3,4)"Tube not installed!";:delay=I
NKEY(500):ENDPROC
  700 IFsec%=FALSETHENsec%=TRUE:proc$
="2nd"ELSEsec%=FALSE:proc$="I/O"
  710 ENDPROC
  720 DEFPROCcannot
  730 PRINTTAB(3,4)"Not available fro
m 2nd processor"
  740 VDU7:delay=INKEY(500):ENDPROC
```

→

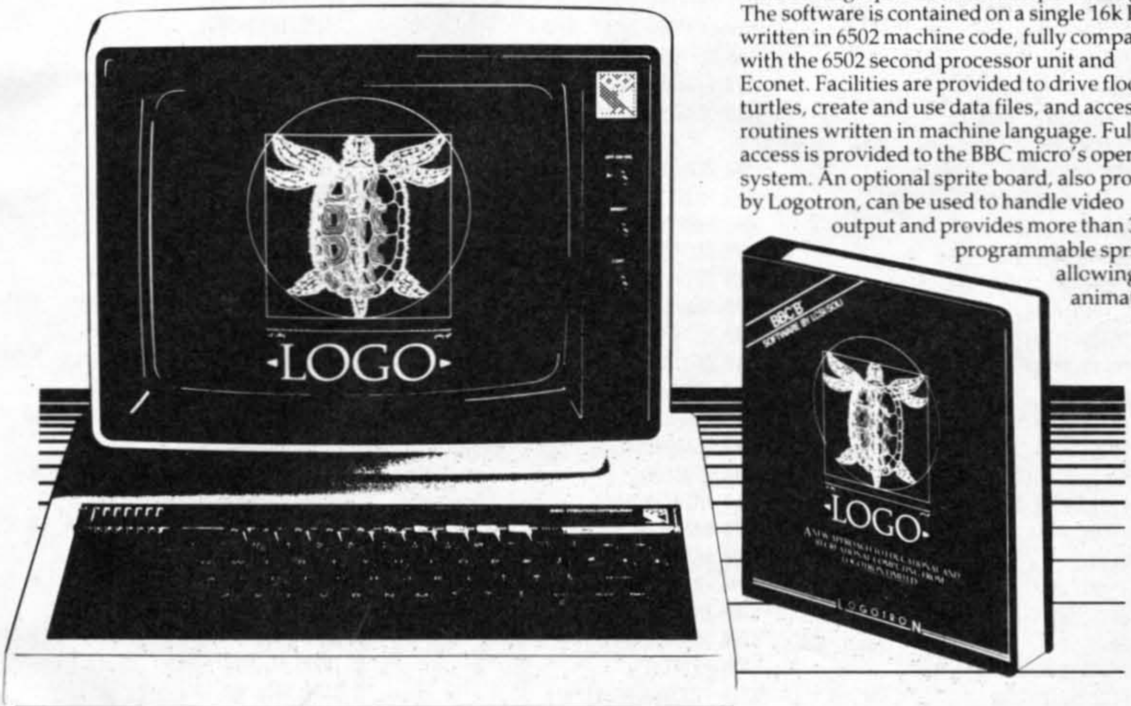
A full LOGO for the BBC model "B" from Logotron.

LOGO is a computer programming language, which appeals equally to children in primary school or to computer scientists at the Massachussets Institute of Technology. Using LOGO, you unconsciously absorb advanced mathematical ideas and fundamental principles of computer programming. LOGO has been available on microcomputers only since 1982. Only this year has it been made available on British home computers like the Sinclair Spectrum and the BBC Micro.

LEONARDO WOULD HAVE LOVED IT!

Leonardo da Vinci would have loved it because LOGO gives full rein to a child's creative imagination, using visual images to convey profound ideas. LOGO could do for computers what perspective did for pictures, bring them alive.

Logotron's LOGO for the BBC "B" was written by LCSI/SOLI, the software house responsible for LOGO implementations for Atari, Apple, IBM, Sinclair, Coleco, and NEC. It's the closest there is to an international LOGO standard, with turtle graphics and full list processing. The software is contained on a single 16k ROM, written in 6502 machine code, fully compatible with the 6502 second processor unit and Econet. Facilities are provided to drive floor turtles, create and use data files, and access routines written in machine language. Full access is provided to the BBC micro's operating system. An optional sprite board, also provided by Logotron, can be used to handle video output and provides more than 30 programmable sprites, allowing true animation.



Please send me further information concerning Logotron's LOGO for the BBC Model "B".

NAME ....

ADDRESS ....

.... ☐ Educational Establishment;

☐ Home user; ☐ Dealer*; ☐ Distributor*

*attach to company letterhead

If you want to know more about LOGO, send for a descriptive leaflet and price list.

To: Logotron, Dept.MU3. 5 Granby Street,
Loughborough, Leicestershire LE11 3DU.
England.

LOGOTRON

Disassembler listing

From Page 136

```
 750 DEFPROCwhat
 760 IFtube%THENPROCcannot:ENDPROC
 770 PROCsetup
 780 FORr%=0TO15
 790 PRINT''"Rom "r%;" ";
 800 IFr%?&2A1=0THEN880
 810 loc=&8009
 820 val=FNrom(loc,r%)
 830 REPEAT
 840 IFval>31ANDval<127PRINTCHR$(val
);ELSEPRINT".";
 850 loc=loc+1
 860 val=FNrom(loc,r%)
 870 UNTILval=0
 880 NEXT
 890 VDU3,15
 900 ENDPROC
 910 DEFFNlook(loc)
 920 IFsec%THEN=?loc
 930 IF(NOTtube%AND&FF)ANDsec%=FALSE
THEN=FNrom(loc,rom)
 940 A%=5:X%=&70:Y%=0
 950 !X%=loc
 960 CALL&FFF1
 970 =X%?4
 980 DEFFNrom(loc,rom%)
 990 !&F6=loc
 1000 Y%=rom%
 1010 =((USR&FFB9)AND&FF)
 1020 DEFPROCdis
 1030 REPEAT
 1040 info$=D$(FNlook(addr%))
 1050 bytes%=VAL(info$)
 1060 op$=MID$(info$,2,3)
 1070 type%=VAL(MID$(info$,5))
 1080 PRINT~addr%;
 1090 FORI%=0TObytes%
 1100 PRINT,~FNlook(addr%+I%);
 1110 NEXT
 1120 addr%=addr%+1
 1130 PRINTTAB(17)op$;" ";
 1140 ONtype%GOSUB1200,1210,1220,1230
,1240,1250,1260,1270,1280,1290,1300,1
310ELSE1150
 1150 PRINT
 1160 addr%=addr%+bytes%
 1170 UNTILaddr%>end%
 1180 VDU3,15
 1190 ENDPROC
 1200 PROCimm:RETURN
 1210 PROCabs:RETURN
 1220 PROCabsX:RETURN
 1230 PROCabsY:RETURN
 1240 PROCrel:RETURN
 1250 PROCzero:RETURN
 1260 PROCzeroX:RETURN
 1270 PROCzeroY:RETURN
 1280 PROCacc:RETURN
 1290 PROCind:RETURN
 1300 PROCindX:RETURN
 1310 PROCindY:RETURN
 1320 DEFPROCimm
 1330 imm%=FNlook(addr%)
 1340 PRINT"#&";~imm%;:PROCbinary(imm
%)
 1350 IFimm%>31ANDimm%<127THENPRINT"
'"CHR$(imm%)"'";
 1360 ENDPROC
 1370 DEFPROCabs
 1380 value%=256*(FNlook(addr%+1))+FN
look(addr%)
 1390 IFvalue%>&FFB8THENPROCoscall:EN
DPROC
 1400 IFvalue%>=&200 ANDvalue%<=&22ET
HENPROCoscall:ENDPROC
 1410 PRINT"&";~value%;
 1420 ENDPROC
 1430 DEFPROCabsX
 1440 PROCabs
 1450 PRINT;",X";
 1460 ENDPROC
 1470 DEFPROCabsY
 1480 PROCabs
 1490 PRINT;",Y";
 1500 ENDPROC
 1510 DEFPROCrel
 1520 offset=(FNlook(addr%)+1)
 1530 IFoffset>127THENoffset=offset-2
56
 1540 BRANCH=addr%+offset
 1550 PRINT"&";~BRANCH;
 1560 ENDPROC
 1570 DEFPROCzero
 1580 PRINT"&";~FNlook(addr%);
 1590 ENDPROC
 1600 DEFPROCzeroX
 1610 PROCzero
 1620 PRINT;",X";
 1630 ENDPROC
 1640 DEFPROCzeroY
 1650 PROCzero
 1660 PRINT;",Y";
 1670 ENDPROC
 1680 DEFPROCacc
 1690 PRINT;"A";
 1700 ENDPROC
 1710 DEFPROCind
 1720 PRINT"(";
 1730 PROCabs:PRINT")";
 1740 ENDPROC
 1750 DEFPROCindX
 1760 PRINT"(&";~(FNlook(addr%))",X)"
;
 1770 ENDPROC
 1780 DEFPROCindY
 1790 PRINT"(&";~(FNlook(addr%))"),Y"
;
 1800 ENDPROC
 1810 DEFPROCbinary(imm%)
 1820 PRINTTAB(26)"%";
 1830 FORI%=7TO0STEP-1
 1840 IF(2^I%ANDimm%)=2^I%THENPRINT"1
";ELSEPRINT"0";
 1850 NEXT
 1860 ENDPROC
 1870 DEFPROCoscall
 1880 IFvalue%>&FFB8THENRESTORE2420EL
SERESTORE2530
 1890 found=FALSE:REPEAT
 1900 READos$:IFEVAL(os$)=value%THENR
EADos$:PRINTos$;:found=TRUEELSEREADos
$
 1910 UNTILfound=TRUEORos$="*"
 1920 IFfound=FALSETHENPRINT"&";~valu
e%;
 1930 ENDPROC
 1940 DEFPROCdump
 1950 REPEAT
 1960 PRINT~addr%;
 1970 FORI%=0TO7
 1980 PRINT~FNlook(addr%+I%);
 1990 NEXT
 2000 PRINT" ";
 2010 FORI%=0TO7
 2020 V=FNlook(addr%+I%)
 2030 IF(V<32)OR(V>126)THENPRINT".";E
LSEPRINTCHR$(V);
 2040 NEXT
 2050 PRINT
 2060 addr%=addr%+8
 2070 UNTILaddr%>end%
 2080 VDU3,15
 2090 ENDPROC
 2100 DATA 0BRK0 ,1ORA11,0???  ,0???
,0???  ,1ORA6 ,1ASL6 ,0???
 2110 DATA 0PHP0 ,1ORA1 ,0ASL9 ,0???
,0???  ,2ORA2 ,2ASL2 ,0???
 2120 DATA 1BPL5 ,1ORA12,0???  ,0???
,0???  ,1ORA7 ,1ASL7 ,0???
 2130 DATA 0CLC0 ,2ORA4 ,0???  ,0???
,0???  ,2ORA3 ,2ASL3 ,0???
 2140 DATA 2JSR2 ,1AND11,0???  ,0???
,1BIT6 ,1AND6 ,1ROL6 ,0???
 2150 DATA 0PLP0 ,1AND1 ,0ROL9 ,0???
,2BIT2 ,2AND2 ,2ROL2 ,0???
 2160 DATA 1BMI5 ,1AND12,0???  ,0???
,0???  ,1AND7 ,1ROL7 ,0???
 2170 DATA 0SEC0 ,2AND4 ,0???  ,0???
,0???  ,2AND3 ,2ROL3 ,0???
 2180 DATA 0RTI0 ,1EOR11,0???  ,0???
,0???  ,1EOR6 ,1LSR6 ,0???
 2190 DATA 0PHA0 ,1EOR1 ,0LSR9 ,0???
,2JMP2 ,2EOR2 ,2LSR2 ,0???
 2200 DATA 1BVC5 ,1EOR12,0???  ,0???
,0???  ,1EOR7 ,1LSR7 ,0???
```

```
2210 DATA 0CLI0 ,2EOR4 ,0??? ,0???
,0???? ,2EOR3 ,2LSR3 ,0???
2220 DATA 0RTS0 ,1ADC11,0??? ,0???
,0??? ,1ADC6 ,1ROR6 ,0???
2230 DATA 0PLA0 ,1ADC1 ,0ROR9 ,0???
,2JMP10,2ADC2 ,2ROR2 ,0???
2240 DATA 1BVS5 ,1ADC12,0??? ,0???
,0??? ,1ADC7 ,1ROR7 ,0???
2250 DATA 0SEI0 ,2ADC4 ,0??? ,0???
,0??? ,2ADC3 ,2ROR3 ,0???
2260 DATA 0??? ,1STA11,0??? ,0???
,1STY6 ,1STA6 ,1STX6 ,0???
2270 DATA 0DEY0 ,0??? ,0TXA0 ,0???
,2STY2 ,2STA2 ,2STX2 ,0???
2280 DATA 1BCC5 ,1STA12,0??? ,0???
,1STY7 ,1STA7 ,1STX8 ,0???
2290 DATA 0TYA0 ,2STA4 ,0TXS0 ,0???
,0??? ,2STA3 ,0??? ,0???
2300 DATA 1LDY1 ,1LDA11,1LDX1 ,0???
,1LDY6 ,1LDA6 ,1LDX6 ,0???
2310 DATA 0TAY0 ,1LDA1 ,0TAX0 ,0???
,2LDY2 ,2LDA2 ,2LDX2 ,0???
2320 DATA 1BCS5 ,1LDA12,0??? ,0???
,1LDY7 ,1LDA7 ,1LDX8 ,0???
2330 DATA 0CLV0 ,2LDA4 ,0TSX0 ,0???
,2LDY3 ,2LDA3 ,2LDX4 ,0???
2340 DATA 1CPY1 ,1CMP11,0??? ,0???
,1CPY6 ,1CMP6 ;1DEC6 ,0???
2350 DATA 0INY0 ,1CMP1 ,0DEX0 ,0???
,2CPY2 ,2CMP2 ,2DEC2 ,0???
2360 DATA 1BNE5 ,1CMP12,0??? ,0???
,0??? ,1CMP7 ,1DEC7 ,0???
2370 DATA 0CLD0 ,2CMP4 ,0??? ,0???
,0??? ,2CMP3 ,2DEC3 ,0???
2380 DATA 1CPX1 ,1SBC11,0??? ,0???
,1CPX6 ,1SBC6 ,1INC6 ,0???
2390 DATA 0INX0 ,1SBC1 ,0NOP0 ,0???
,2CPX2 ,2SBC2 ,2INC2 ,0???
2400 DATA 1BEQ5 ,1SBC12,0??? ,0???
,0??? ,1SBC7 ,1INC7 ,0???
2410 DATA 0SED0 ,2SBC4 ,0??? ,0???
,0??? ,2SBC3 ,2INC3 ,0???
2420 DATA &FFF7,OSCLI ,&FFF4,OSBYTE
2430 DATA &FFF1,OSWORD,&FFEE,OSWRCH
2440 DATA &FFE7,OSNEWL,&FFE3,OSASCI
2450 DATA &FFE0,OSRDCH,&FFDD,OSFILE
2460 DATA &FFDA,OSARGS
2470 DATA &FFD4,OSBPUT,&FFD7,OSBGET
2480 DATA &FFCE,OSFIND,&FFD1,OSGBPB
2490 DATA &FFC8,NVWRCH,&FFCB,NVRDCH
2500 DATA &FFC2,GSINIT,&FFC5,GSREAD
2510 DATA &FFB9,OSRROM,&FFBF,OSEVEN
2520 DATA0,*
2530 DATA&200,USERV,&202,BRKV
2540 DATA&204,IRQ1V,&206,IRQ2V
2550 DATA&208,CLIV ,&20A,BYTEV
2560 DATA&20C,WORDV,&20E,WRCHV
2570 DATA&210,RDCHV,&212,FILEV
2580 DATA&214,ARGSV,&216,BGETV
2590 DATA&218,BPUTV,&21A,GBPBV
2600 DATA&21C,FINDV,&21E,FSCV
2610 DATA&220,EVNTV,&222,UPTV
2620 DATA&224,NETV ,&226,VDUV
2630 DATA&228,KEYBV,&22A,INSV
2640 DATA&22C,REMV ,&22E,CRESV
2650 DATA0,*
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

Datapen **BBC Lightpen Programs** Datapen

BEEBPEN DRAWING PROGRAM
A comprehensive Mode 2 colour drawing program allowing plot commands, painting, circles, text, character defining, saving and loading to tape or disc, all to be selected and used with the lightpen.
PRICE £11.95

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Display
CREATOR

TELETEXT DISPLAY CREATOR/EDITOR
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BRITAIN
The first in a series of educational Geography and Geology programs. Britain comes complete with three sets of tests, and these may be very easily changed by adding DATA statements in the Basic program. Full instructions and grid map supplied.
PRICE £6.95

SUPERIOR PERFORMANCE
- Insensitive to ambient lighting
- Responds to different colours
- Program accessible LED lamp readout
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SUPERIOR PROGRAMS
- Tape storage of your work
- Good documentation
- User routines provided on tape and on printout

Please deduct £1.50 off each program if more than 1 ordered.

The Datapen Lightpen itself comes complete with handbook, software on tape including two drawing programs and a printed listing showing useful routines.

PRICE £25.00

Two drawing programs, SKETCH and SHAPE-CREATE are included with the lightpen and the programs shown above may be ordered additionally, or separately as required.

All prices above include VAT, postage and packing.

Please send your cheque/P.O. to:-

**Dept. MU2 Datapen Microtechnology Ltd.,
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BUS

Talker listing

From Page 91

```
  10 REM ============================
=
  20 REM SPEECH SYNTHESISER UTILITY

  30 REM      BY KEITH McALPINE
  40 REM        (c) MICRO USER

  50 REM USES ACORN SPEECH PHROM A.
  60 REM VERSION 2.1    WITH OS 1.2

  70 REM ============================
=
  80 *TV255,1
  90 MODE7
 100 ON ERROR VDU3:PROCerr
 110 PROCintro
 120 PROCinstruct
 130 CLS:PROCscreen
 140 REPEAT
 150 A$=INKEY$(0)
 160 IF ASC(A$)=138 PROCdown
 170 IF ASC(A$)=139 PROCup
 180 IF INKEY-1 AND INKEY-58 value=1
37:PROCnextup
 190 IF INKEY-1 AND INKEY-42 value=2
77:PROCnextdown
 200 IF INKEY-1 AND(ASC(A$)>64 AND A
SC(A$)<91) value=jumps(ASC(A$)-64)-10
:PROCnextdown
 210 IF ASC(A$)=135 PROCselect
 220 IF ASC(A$)=127 PROCdelete
 230 IF ASC(A$)=13 PROCspeech
 240 UNTIL INKEY-33
 250 PROCdisplay
 260 PRINT '"Do you want to make ano
 ther sentence?"
 270 A$= GET$
 280 IF A$="Y" OR A$="y" THEN CLEAR:
 SOUND -1,254,0,0: SOUND -1,162,0,0:
GOTO 120
 290 END
 300 DEFPROCscreen
 310 cur$=CHR$93:X%=5:Y%=7:*FX4,1
 320 amount=0:value=127
 330 DIM word$(166),num(35),jumps(26
),sent$(30)
 340 RESTORE440
 350 FORloop=127TO291:READ data$
 360 word$(loop-126)=data$
 370 NEXT loop
 380 FORloop=1TO18:sent$(loop)="":NE
XT loop
 390 FORloop=1TO10:PRINTTAB(7,loop+1
);CHR$(RND(7)+128);word$(loop);TAB(16
);"number :";126+loop
 400 NEXT loop
 410 FORloop=1TO20:num(loop)=0:NEXT
loop
 420 FORloop=1TO26:READ data:jumps(l
oop)=data:NEXT loop
 430 PROCprint
 440 DATA (0.125),(0.25),(TONE 1),(T
ONE 2),-D,-ED,-ING,-S,-TEEN,-TH,-TY,-
Z,ZERO,HUNDRED,THOUSAND,ONE:WON,TWO:T
O:TOO,TWEN-,THREE,THIR-,FOUR:FOR:FORE
,FOR-,FIVE,FIF-,SIX,SIX-,SEVEN,SEVEN-
,EIGHT:ATE,EIGHT-,NINE,NIN-,A,ACORN,A
FTER,AGAIN,AMOUNT
 450 DATA AN,AND,ANOTHER,ANSWER,ANY,
AVAILABLE,B:BEE:BE,BAD,BETWEEN,BOTH,B
UTTON,C:SEE:SEA,CASSETTE,CHARACTER,CO
MPLETE,COMPUTER,CORRECT,D,DATA,DATE,D
O,DOLLAR,DONT,DOWN,E,EACH,ELEVEN,ENGA
GED,ENTER,ERROR,ESCAPE,F,FEW,FILE,FIR
ST,FOUND,FROM
 460 DATA G,GOOD,H,HAVE,I:EYE,ILLEGA
L,IN-,INPUT,IS,J:JAY,K,KEY,L,LARGE,LA
ST,LINE,M,MANY,MINUS,MORE,MUST,N,NAME
,NEGATIVE,NEW,NO:KNOW,NOT:KNOT,NOW,NU
MBER,O,O'CLOCK,OF,OFF,OLD,ON,ONLY,OR,
P:PEA,PARAMETER,PENCE,PLEASE,PLUS,POI
NT,POSITIVE,POUN-
 470 DATA PRESS,PROGRAM,Q:QUEUE,R:AR
E,RED,RESET,RETURN,RUN,RUNNING,S,SAME
,SCORE,SECOND,SMALL,START,STOP,SWITCH
,T:TEA:TEE,TEN,THANK,THAT,THE,THEN,TH
IRD,THIS,TIME,TRY,TWELVE,TYPE,U:YOU,U
H,UP,V,VERY,W,WANT,WAS,WERE,WHAT,WHIC
H,X,Y:WHY,YEAR,YES
 480 DATA YOUR,Z
 490 DATA157,167,167,177,187,187,197
,197,197,207,207,207,217,217,227,237,
247,247,247,257,267,277,277,277,287,2
87
 500 VDU23;8202;0;0;0;
 510 ENDPROC
 520 :
 530 DEFPROCdown
 540 IFY%=11 PROCnextdown:ENDPROC
 550 IFvalue=287 AND Y%=6 ENDPROC
 560 PRINTTAB(X%,Y%);" "
 570 Y%=Y%+1:PRINTTAB(X%,Y%);cur$
 580 PRINTTAB(X%,Y%);cur$
 590 ENDPROC
 600 :
 610 DEFPROCup
 620 IFY%=2 PROCnextup:ENDPROC
 630 PRINTTAB(X%,Y%);" "
 640 Y%=Y%-1:PRINTTAB(X%,Y%);cur$
 650 ENDPROC
 660 :
 670 DEFPROCselect:*FX15,0
 680 IF amount>=30 SOUND-1,143,0,0:S
OUND-1,218,0,0:SOUND-1,239,0,0:SOUND-
1,134,0,0:ENDPROC
 690 amount=amount+1
 700 length=LEN(word$((value-126)+Y%
-2))
 710 FORloop=1TOlength
 720 pos$=MID$(word$((value-126)+Y%-
2),loop,1)
 730 IFpos$=":" THEN word$((value-12
6)+Y%-2)=LEFT$(word$((value-126)+Y%-2
),loop-1):loop=13
 740 NEXTloop
 750 sent$(amount)=" "+word$((value-
126)+Y%-2)
 760 FORloop=1TO30
 770 IFnum(loop)=0 num(loop)=value+Y
%-2:loop=30
 780 NEXT loop
 790 PRINTTAB(0,15);
 800 FORloop=1 TO amount:PRINT;sent$
(loop);:NEXT loop
 810 PRINTTAB(25,24);30-amount;" ";
 820 ENDPROC
 830 :
 840 DEFPROCdelete:*FX15,0
 850 IFamount<=0 PROCsay:ENDPROC
 860 length=LEN(sent$(amount)):sent$
(amount)="":amount=amount-1:PRINTTAB(
0,15);
 870 num(amount+1)=0
 880 IFamount=0 PRINTTAB(0,15);SPC13
 890 FORloop=1 TO amount:PRINT;sent$
(loop);:NEXT loop
 900 PRINT;SPC(length)
 910 PRINTTAB(25,24);30-amount;" ";:
ENDPROC
 920 :
 930 DEFPROCspeech:*FX15,0
 940 IFamount<=0 PROCsay:PROCwt(40):
ENDPROC
 950 looplength=0:FORloop=1TO32
 960 IF num(32)=0 looplength=32
 970 IF num(loop)=0 looplength=loop:
loop=32
 980 NEXT loop
 990 FOR loop=1TO looplength-1
1000 SOUND-1,num(loop),0,0
1010 NEXT loop
1020 ENDPROC
1030 :
1040 DEFPROCnextup
1050 IFvalue=127 ENDPROC
1060 value=value-10
1070 VDU28,0,15,40,0:CLS
1080 FORloop=1TO10
1090 PRINTTAB(7,loop+1);CHR$(RND(7)+
128);word$(value+loop-127);TAB(16);"n
umber :";value+loop-1
1100 NEXT loop
1110 VDU28,0,25,40,0:Y%=7:PROCprint:
ENDPROC
1120 :
```

→

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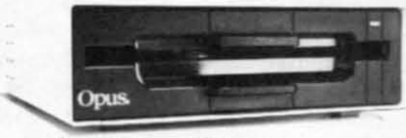

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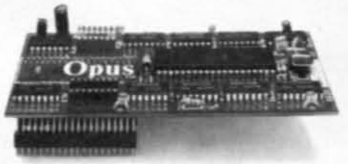

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Talker listing

From Page 141

```
 1130 DEFPROCnextdown
 1140 IFvalue>277 ENDPROC
 1150 value=value+10
 1160 VDU28,0,15,40,0:CLS
 1170 IFvalue=287 PROCwrite:FORloop=1
TO5:GOTO1190
 1180 FORloop=1TO10
 1190 PRINTTAB(7,loop+1);CHR$(RND(7)+
128);word$(value+loop-127);TAB(16);"n
umber :";value+loop-1
 1200 NEXT loop
 1210 VDU28,0,25,40,0:Y%=7:PROCprint
 1220 IFvalue=287 Y%=4
 1230 ENDPROC
 1240 :
 1250 DEFPROCprint:PRINTTAB(10,14);CH
R$130;"Your sentence is:"
 1260  PRINTTAB(0,15);
 1270 FORloop=1TOamount:PRINT;sent$(l
oop);:NEXT loop
 1280 PRINTTAB(0,24);CHR$133;STRING$(
10,"*");CHR$131;"WORDS LEFT = ";30-am
ount;" ";CHR$133;STRING$(10,"*");
 1290 PRINTTAB(2,0);CHR$134;CHR$136;"
S P E E C H       U T I L I T Y"
 1300 IF value=287 Y%=4:GOTO1320
 1310 PROCborder(1,12,146)
 1320 PRINTTAB(X%,Y%);cur$:ENDPROC
 1330 :
 1340 DEFPROCdisplay
 1350 CLS:*FX15,1
 1360 IFamount<=0 PROCsay:GOTO1530
 1370 PRINT "Do you want a printout (
Y/N)"
 1380 printout$=GET$
 1390 CLS
 1400 IF printout$="N" GOTO 1430 ELSE
 IF printout$="Y" GOTO 1420
 1410 GOTO1370
 1420 SOUND-1,246,0,0:SOUND-1,235,0,0
:SOUND-1,216,0,0:VDU2
 1430 PRINTTAB(10,0);CHR$141;CHR$131;
"Your sentence ";TAB(10,1);CHR$141;CH
R$131;"Your sentence "
 1440 VDU14
 1450 PRINTTAB(0,3);
 1460 FORloop=1TOamount:PRINT;sent$(l
oop);:NEXT loop
 1470 PRINT'CHR$130"is made up from s
ound statements:-"
 1480 PRINT
 1490 FORloop=1TOamount STEP2
 1500 PRINTTAB(0)"SOUND -1,";num(loop
);",0,0";: IF loop+1<=amount THEN PRI
NT TAB(20);"SOUND -1,";num(loop+1);",
0,0" ELSE PRINT
 1510 NEXT loop
 1520 IFprintout$="Y" SOUND-1,246,0,0
:SOUND-1,233,0,0:SOUND-1,216,0,0:VDU3
 1530 FORloop=1TO6:READ parameters:SO
UND-1,parameters,0,0:NEXT loop
 1540 *FX4,0
 1550 VDU15:ENDPROC
 1560 DATA 265,275,147,254,270,247
 1570 :
 1580 DEFPROCintro:*FX15,0
 1590 VDU23;8202;0;0;0;:RESTORE1670
 1600 FORloop=1TO5:READdata$:PRINTTAB
(8,loop+1);CHR$147;:FORloop2=1TO23:IF
MID$(data$,loop2,1)="*" PRINT;CHR$255
; ELSE PRINT;" ";
 1610 NEXT loop2,loop
 1620 FORloop=1TO5:READdata$:PRINTTAB
(6,loop+8);CHR$147;:FORloop2=1TO28:IF
MID$(data$,loop2,1)="*" PRINT;CHR$255
; ELSE PRINT;" ";
 1630 NEXT loop2,loop
 1640 PRINTTAB(18,17);CHR$132;"BY"TAB
(12,18);CHR$130;"KEITH MCALPINE."
 1650 PROCborder(16,19,150)
 1660 SOUND-1,204,0,0:SOUND-1,159,0,0
:SOUND-1,202,0,0:SOUND-1,271,0,0:SOUN
D-1,235,0,0:SOUND-1,270,0,0:SOUND-1,2
47,0,0:PROCwt(250)
 1670 DATA"*** *** *** *** *** * *","
*   * * *   *   *   * *","*** *** ***
 *** *   ***","  * *   *   *   *   *
*","*** *   *** *** *** * *"
 1680 DATA"* * *** *** *   *** *** *
*","* *  *   *  *    *   *  * *","* *
  *   *  *    *   *  ***","* *  *   *
  *    *   *   * ","***  *  *** *** *
**  *   * "
 1690 ENDPROC
 1700 :
 1710 DEFPROCborder(Y1,Y2,COL):*FX15,0
 1720 PRINTTAB(0,Y1);CHR$(COL);CHR$18
3;STRING$(36,CHR$163);CHR$235
 1730 FORloop=Y1+1 TO Y2-1
 1740 PRINTTAB(0,loop);CHR$(COL);CHR$
181;TAB(37,loop);CHR$(COL);CHR$234
 1750 NEXT loop
 1760 PRINTTAB(0,Y2);CHR$(COL);CHR$24
5;STRING$(36,CHR$240);CHR$250
 1770 ENDPROC
 1780 :
 1790 DEFPROCwrite
 1800 FORloop=8TO9:PRINTTAB(2,loop);C
HR$141;CHR$129;"This program uses the
 words and":NEXT loop
 1810 FORloop=10TO11:PRINTTAB(3,loop)
;CHR$141;CHR$129;"word-parts in SPEEC
H PHROM A.":NEXT loop
 1820 PROCborder(1,7,146)
 1830 ENDPROC
 1840 :
 1850 DEFPROCsay:*FX15,0
 1860 SOUND-1,226,0,0:SOUND-1,239,0,0
:SOUND-1,134,0,0:ENDPROC
 1870 :
 1880 DEFPROCinstruct:A=INKEY(300):CLS
 1890 SOUND-1,246,0,0:SOUND-1,252,0,0
:SOUND-1,143,0,0:SOUND-1,260,0,0
 1900 PRINTCHR$(129);CHR$(157);CHR$(1
31);CHR$(141);SPC10;"INSTRUCTIONS"
 1910 PRINTCHR$(129);CHR$(157);CHR$(1
31);CHR$(141);SPC10;"INSTRUCTIONS"
 1920 PRINT'CHR$131"This program is a
  utility  for making"
 1930 PRINT'CHR$131"sentences using";
CHR$130;"Acorn's SPEECH PHROM A."
 1940 PRINT'CHR$133"The controls to u
se are:"
 1950 PRINT'CHR$134;"^.......(SINGLE
STEP)...MOVE MARKER UP"
 1960 PRINTCHR$134;"v.......(SINGLE S
TEP).MOVE MARKER DOWN"
 1970 PRINTCHR$134;"SHIFT ^..........
.MOVE MARKER TO START"
 1980 PRINTCHR$134;"SHIFT v..........
...MOVE MARKER TO END"
 1990 PRINTCHR$134;"SHIFT <eg A>...WO
RDS STARTING WITH 'A'"
 2000 PRINTCHR$134;"RETURN...........
.......SPEAK SENTENCE"
 2010 PRINTCHR$134;"COPY.............
.ADD WORD TO SENTENCE"
 2020 PRINTCHR$134;"DELETE.......DELE
TE WORD FROM SENTENCE"
 2030 PRINTCHR$134;"f0.....QUIT PROGR
AM & PRINT PARAMETERS"
 2040 PRINTTAB(0,24)CHR$(129);CHR$(15
7);CHR$(131);"Press <RETURN> to start
. . . . ";
 2050 *FX21,0
 2060 REPEAT UNTIL GET=13
 2070 ENDPROC
 2080 :
 2090 DEFPROCwt(TIM):TIME=0:REPEAT UN
TIL TIME>TIM:ENDPROC
 2100 REM==========================
 2110 DEFPROCerr
 2120 *FX15,0
 2130 CLS:VDU 23;8202;0;0;0;
 2140 PRINTTAB(0,0);CHR$(129);CHR$(15
7);CHR$(131);CHR$(141);SPC10;"ERROR P
ROCEDURE"
 2150 PRINTCHR$(129);CHR$(157);CHR$(1
31);CHR$(141);SPC10;"ERROR PROCEDURE"
 2160 VDU28,1,4,39,1
 2170 REPORT:PRINT;CHR$(130)" at line
 number ";CHR$(131);ERL
 2180 VDU28,1,24,39,3:*FX4,0
 2190 END
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

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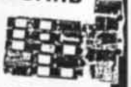

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At the risk of upsetting those clever Acorn chappies, MIKE BIBBY explains . . .

The ins and outs of ROM routines

AMONG the questions asked fairly frequently on our technical advice stand at the Electron & BBC Micro User Shows are: "How can you print out numbers from machine code?", "Are there any routines you can use in the Basic ROM?" and "How do you get random numbers?"

Well, there are routines in the Basic ROM you can use but beware – Acorn don't like you using them. Alright, that's never stopped anybody, but in this case those terribly clever Acorn chappies have a point.

You see, whenever you alter or update a machine code program, you tend to change where things are stored in memory.

Basic is just one long machine code program, and there are several versions. The ones that interest us are Basic I and Basic II. Each contains much the same routines, but the addresses they're at tend to vary.

So if I write my program on a Basic II machine using an address at &991F, for example, it won't run on a Basic I model where the routine starts at a different address.

Of course, the unsuspecting user doesn't know this so Acorn and their dealers get inundated with complaints from customers saying their machine doesn't work properly.

This must be particularly galling to Acorn as they've gone to such a lot of trouble making calls such as OSWRCH – which writes a character – easily accessible and well documented within the operating system.

Operating system?

Well, yes. The fundamental BBC Micro has two large machine code programs built in. One of them is the language – Basic – and the other, which controls the machine, is called the Operating System – OS.

They each perform different functions. The language is the thinking part that does all your sums and follows your complicated instructions. The OS handles the physical side of things, controlling all the input and output – be it from keyboard, to screen, printer or whatever.

If you like, the language is the higher brain concerned with the micro's thought processes, while the OS is the lower brain gathering and sending information to and from the real world.

It may seem strange splitting things like this, but there's a good reason.

If you put the program to write characters on the screen into the OS and keep it separate from the language, you can change language at will. The micro still knows where to go to put a character on the screen since the OS hasn't changed.

Having taken all this trouble, it's no wonder that Acorn folk get annoyed when people disregard all their efforts and use ROM routines directly.

But we're going to do it anyway.

You see, while Acorn go ahead and provide nice things like OSWRCH, they're at rather a primitive level.

To get them to do what you want still requires a fair bit of work. It's like being shown how to use PRINT in Basic. You've still got a lot of work to do before you can get messages to appear on screen exactly the way you want them.

It's the same with OSWRCH – even when you know how to use it, there's still a lot of things you have to do and know before you can do something as fundamental as, for example, print out the accumulator in hex.

So for beginners, using the ready parcelled routines in the Basic ROM can make sense.

After all, if you think that your routine should result in &2A being left in the accumulator, it's nice to be able to print out A and see for yourself.

Similarly, there are a lot of interesting and simple machine code games you can write, provided you know how to generate a random number – which can be pretty complicated.

So we're going to answer the questions raised at the beginning by resorting to using ROM routines. However, with due respect to the Acorn chaps, they must only be used in private by consenting adults.

Right, let's take a look at the random integer problem. To make it easier we'll restrict it to the range 0 to 255.

Now there's a workspace between memory locations &2A and &2D where Basic gets to grips with integers. There's also a routine at &AF51 that puts a random number into this workspace. (It's at &AF80 in Basic I.)

We can couple this random number generator with a routine at &991F that prints out the least significant two bytes of the integer workspace in decimal. (At &98F1 in Basic I.)

Since we're only interested in random numbers between 0 and 255, after calling the generator, we need only concern ourselves with the contents of &2A. We achieve this by setting &2B to zero before printing.

Program II again generates a random number and then prints it in hex.

The routine that does the latter – &B545 in Basic II and &8570 in Basic I – prints out the contents of the accumulator in hex.

This time therefore, we don't have to bother with setting &2B to zero. We just load our accumulator from &2A after generating the random number, then call our hex printout routine.

Right, those routines should keep you novice machine code programmers busy. Let's see how you use them in your own programs.

→

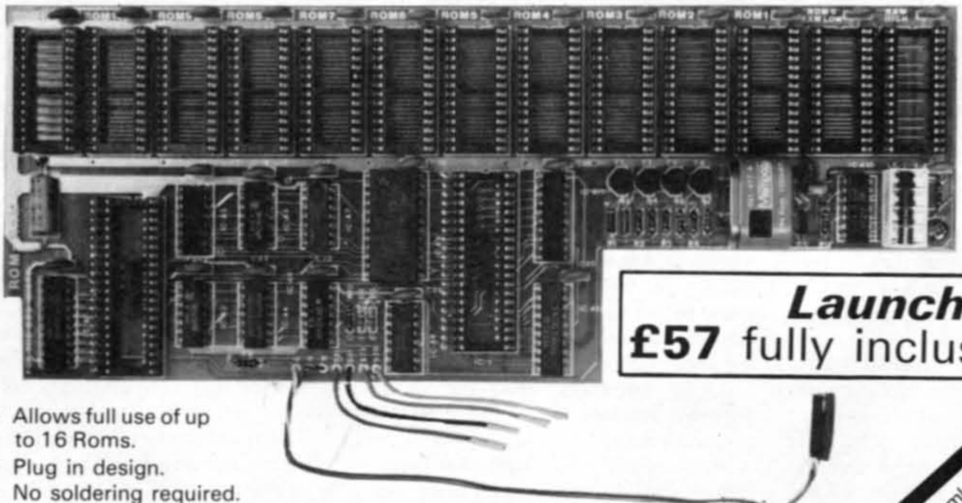
From Page 145

Program I

```
10 REM Program I
20 REM This generates a random
30 REM number between 0 and 255
40 REM then prints it in decimal.
50 REM This is a Basic II version
60 REM only, as it directly
70 REM addresses ROM.
80 REM The routines are:
90 REM &AF51 puts a random integer
100 REM into &2A - &2D, the integer
110 REM workspace. In Basic I this
120 REM routine is at &AF80
130 REM &991F prints out &2A,2B in
140 REM decimal. Basic I is &98F1.
150 REM In this program &2B is set
160 REM to zero, so in effect just
170 REM &2A is printed.
180 DIM code% 25
190 randInt = &AF51
200 printDec = &991F
210 workspace = &2A
220 FOR pass% = 0 TO 2 STEP 2
230 P% = code%
240 [
250 OPT pass%
260 .start JSR randInt
; put a random number in &2A,D
270 LDA # &00
280 STA workspace + 1
; let's just have up to 255
290 JSR printDec
; print out &2A,B in decimal
300 RTS
310 ]
320 NEXT pass%
330 PRINT'"Press space for a number"
340 REPEAT
350 wait$ = GET$
360 CALL code%
370 VDU 13,10
380 UNTIL FALSE
```

Program II

```
10 REM Program II
20 REM This generates a random
30 REM number between 0 and 255
40 REM then prints it in hex.
50 REM This is a Basic II version
60 REM only as it directly
70 REM addresses ROM.
80 REM The routines are :
90 REM &AF51 puts a random integer
100 REM into &2A - &2D, the integer
110 REM workspace. In Basic I this
120 REM routine is at &AF80
130 REM &B545 prints out the
140 REM accumulator in hex.
150 REM Basic I is &8570.
160 DIM code% 25
170 randInt = &AF51
180 printHex = &B545
190 workspace = &2A
200 FOR pass% = 0 TO 2 STEP 2
210 P% = code%
220 [
230 OPT pass%
240 .start JSR randInt
; put a random number in &2A,D
250 LDA workspace
; load accumulator with low byte
260 JSR printHex
; print out as hex
270 RTS
280 ]
290 NEXT pass%
300 PRINT'"Press space for a number"
310 REPEAT
320 wait$ = GET$
330 CALL code%
340 VDU 13,10
350 UNTIL FALSE
```



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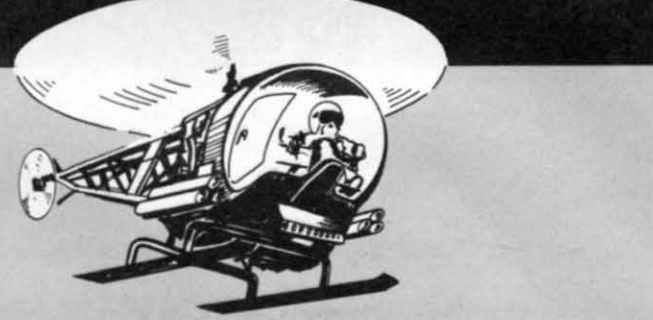
'Copter Dogfight listing

From Page 95

```
   10 REM (C) The Micro User
   20 MODE1
   25 VDU23;8202;0;0;0
   30 VDU23,227,82,169,85,42,255,42,8
5,170
   40 VDU23,228,138,149,170,84,255,84
,170,149
   50 VDU23,229,0,0,0,60,60,0,0,0
   60 VDU23,230,255,4,62,91,255,127,6
,63
   70 VDU23,231,224,0,0,193,255,193,0
,192
   80 VDU23,232,255,32,124,218,255,25
4,96,252
   90 VDU23,233,7,0,0,131,255,131,0,3
  100 VDU23,254,255,255,255,255,255,2
55,255,255
  110 ENVELOPE1,1,10,-2,0,150,100,0,5
0,-2,0,-1,50,-126
  120 ENVELOPE2,1,1,-1,0,1,1,0,64,-1,
-1,-1,128,20
  130 DATA104,.25,112,.25,120,.25,124
,.25,132,.25,124,.25,120,.25,112,.25,
104,.5,132,.5,104,1.5,104,0
  140 DATA84,.75,112,.25,84,.25,112,.
25,112,1.5,132,1.5,132,0
  150 PROCTitle
  160 MODE2
  170 M%=0:N%=0
  180 RESTORE130:PROCTune:@%=0:VDU23,
1,0;0;0;0;
  190 X%=1024:Y%=32:A%=132:B%=32:I%=0
:J%=0:F%=1:R%=0:x%=0:y%=0:a%=0:b%=0
  200 E%=0:count%=0:G%=0:Count%=0:LIF
E%=6:life%=6:SHOT%=5:shot%=5
  210 PROCSet_up
  220 REPEAT
  230 PROCHeli_one
  240 PROCHeli_two
  250 PROCFire_one
  260 PROCFire_two
  270 PROCScore
  280 UNTILLIFE%=0 OR life%=0
  290 PROCEnd
  300 END
  310 DEF PROCHeli_one
  320 U%=X%:V%=Y%
  330 IFZ%=74PROCJoy_one
  340 IFZ%=75PROCKey_one
  350 Y%=Y%+y%:IFY%>890Y%=890:y%=0ELS
EIFY%<32Y%=32:y%=0
  360 X%=X%+x%:IFX%>1151X%=0ELSEIFX%<
0X%=1151
  370 IFPOINT(X%,Y%-32)=2ORPOINT(X%+1
28,Y%-32)=2ORPOINT(X%+64,Y%-32)=2PROC
Explosion(4)
  380 GCOL0,4:MOVEU%,V%:VDU254,254:GC
OL0,0:MOVEX%,Y%:IFF%=0VDU233,232ELSEI
FF%=1VDU230,231
  390 IFX%>(A%-128):IFX%<(A%+128):IFY
%<(B%+32):IFY%>(B%-32) PROCExplosion(
3)
  400 IFY%=32:IFX%>600 shot%=5
  410 ENDPROC
  420 DEF PROCHeli_two
  430 C%=A%:D%=B%
  440 IFZ%=74PROCJoy_two
  450 IFZ%=75PROCKey_two
  460 B%=B%+b%:IFB%>890B%=890:b%=0ELS
EIFB%<32B%=32:b%=0
  470 A%=A%+a%:IFA%>1151A%=0ELSEIFA%<
0A%=1151
  480 IFPOINT(A%,B%-32)=2ORPOINT(A%+1
28,B%-32)=2ORPOINT(A%+64,B%-32)=2PROC
Explosion(5)
  490 GCOL0,4:MOVEC%,D%:VDU254,254:GC
OL0,1:MOVEA%,B%:IFR%=0VDU233,232ELSEI
FR%=1VDU230,231
  500 IFB%=32:IFA%<500 SHOT%=5
  510 ENDPROC
  520 DEF PROCFire_one:IFI%=1ORI%=2TH
EN570
  530 IFshot%=0 ENDPROC
  540 E%=ADVAL(0)AND 3
  550 IFI%=0:IFE%=1ORE%=3ORINKEY(-74)
:SOUND&11,1,4,1:shot%=shot%-1:IFF%=0T
HENI%=1:M1%=X%+128:M2%=Y%-8 ELSE IFI%
=0:IFE%=1ORE%=3ORINKEY(-74):IFF%=1 TH
ENI%=2:M1%=X%:M2%=Y%-8
  560 IFI%=0 ENDPROC
  570 GCOL0,4:MOVEM1%,M2%:VDU229
  580 IFI%=1 M1%=M1%+96 ELSE IFI%=2 M
1%=M1%-96
  590 IFPOINT(M1%,M2%-16)=1ORPOINT(M1
%-32,M2%-8)=1ORPOINT(M1%+32,M2%-24)=1
PROCExplosion(2):ENDPROC
  600 IFPOINT(M1%+32,M2%-16)=2count%=
0:I%=0:ENDPROC
  610 count%=count%+1
  620 IFcount%=8 count%=0:I%=0:ENDPROC
  630 GCOL0,7:MOVEM1%,M2%:VDU229
  640 ENDPROC
  650 DEF PROCFire_two:IFJ%=1ORJ%=2TH
EN700
  660 IFSHOT%=0ENDPROC
  670 G%=ADVAL(0)AND 3
  680 IFJ%=0:IFG%=2ORG%=3ORINKEY(-2):
SOUND&12,1,4,1:SHOT%=SHOT%-1:IFR%=0TH
ENJ%=1:M3%=A%+128:M4%=B%-8 ELSE IFJ%=
0:IFG%=2ORG%=3ORINKEY(-2):IFR%=1 THEN
 J%=2:M3%=A%:M4%=B%-8
  690 IFJ%=0 ENDPROC
  700 GCOL0,4:MOVEM3%,M4%:VDU229
  710 IFJ%=1 M3%=M3%+96 ELSE IFJ%=2 M
3%=M3%-96
  720 IFPOINT(M3%,M4%-16)=0ORPOINT(M3
%+32,M4%-8)=0ORPOINT(M3%-32,M4%-24)=0
PROCExplosion(1):ENDPROC
  730 IFPOINT(M3%+32,M4%-16)=2Count%=
0:J%=0:ENDPROC
  740 Count%=Count%+1
  750 IFCount%=8 Count%=0:J%=0:ENDPROC
  760 GCOL0,7:MOVEM3%,M4%:VDU229
  770 ENDPROC
  780 DEFPROCExplosion(S%)
  790 IFS%=4X%=U%:Y%=V%
  800 IFS%=5A%=C%:B%=D%
  810 SOUND0,-15,6,10
  820 FORLOOP%=1TO5:GCOL0,LOOP%
  830 IFS%=1ORS%=4 MOVEX%,Y%:VDU227,2
28
  840 IFS%=2ORS%=5 MOVEA%,B%:VDU227,2
28
  850 IFS%=3 MOVEX%,Y%:VDU227,228:MOV
EA%,B%:VDU227,228
  860 NEXT
  870 IFS%=1ORS%=4 GCOL0,4:MOVEX%,Y%:
VDU254,254:X%=1024:Y%=32:x%=0:y%=0:sh
ot%=5
  880 IFS%=2ORS%=5 GCOL0,4:MOVEA%,B%:
VDU254,254:A%=132:B%=32:a%=0:b%=0:SHO
T%=5
  890 IFS%=3 GCOL0,4:MOVEA%,B%:VDU254
,254:MOVEX%,Y%:VDU254,254:A%=132:B%=3
2:X%=1024:Y%=32:x%=0:y%=0:a%=0:b%=0:s
hot%=5:SHOT%=5
  900 IFS%=1Count%=0:J%=0
  910 IFS%=2count%=0:I%=0
  920 IFS%=1OR S%=3ORS%=4THENPROCDele
te_two
  930 IFS%=2OR S%=3ORS%=5THENPROCDele
te_one
  940 PROCDelay(5)
  950 S%=0:ENDPROC
  960 DEFPROCDelete_one
  970 IFLIFE%=6MOVE290,950:VDU254,254
  980 IFLIFE%=5MOVE150,950:VDU254,254
  990 IFLIFE%=4MOVE10,950:VDU254,254
 1000 IFLIFE%=3MOVE290,1000:VDU254,25
4
 1010 IFLIFE%=2MOVE150,1000:VDU254,25
4
 1020 IFLIFE%=1MOVE10,1000:VDU254,254
 1030 LIFE%=LIFE%-1
 1040 ENDPROC
 1050 DEFPROCDelete_two
 1060 IFlife%=6MOVE870,950:VDU254,254
 1070 IFlife%=5MOVE1010,950:VDU254,25
4
 1080 IFlife%=4MOVE1150,950:VDU254,25
4
 1090 IFlife%=3MOVE870,1000:VDU254,25
4
```

→

'Copter Dogfight listing



From Page 147

```
 1100 IFlife%=2MOVE1010,1000:VDU254,2
54
 1110 IFlife%=1MOVE1150,1000:VDU254,2
54
 1120 life%=life%-1
 1130 ENDPROC
 1140 DEFPROCScore
 1150 VDU4:VDU23;8202;0;0;0;:PRINTTAB
(0,1)SHOT%"    "shot%:VDU5
 1160 ENDPROC
 1170 DEFPROCTitle
 1180 COLOUR130:COLOUR0:CLS
 1190 PRINTTAB(10,5)"Helicopter Dog F
ight"
 1200 COLOUR1:PRINTTAB(4,6);CHR$233;C
HR$232;
 1210 COLOUR0:PRINTTAB(35,6);CHR$230;
CHR$231;
 1220 PRINTTAB(19,8);"by"
 1230 PRINTTAB(15,12)"J.K.Thorpe"
 1240 RESTORE130:PROCTune
 1250 PRINTTAB(12,19)"Press 'space' t
o"
 1260 PRINTTAB(16,21)"continue"
 1270 XX=GET
 1280 IFXX<>32THEN1270
 1290 PROCInst
 1300 ENDPROC
 1310 DEFPROCTune
 1320 C=16
 1330 REPEAT:READP,D
 1340 SOUND1,2,P,D*C
 1350 PROCDelay(4)
 1360 SOUND2,2,P,D*C
 1370 PROCDelay(4)
 1380 SOUND3,2,P,D*C
 1390 PROCDelay(4)
 1400 UNTILD=0:ENDPROC
 1410 DEFPROCDelay(time)
 1420 now=TIME:REPEATUNTILTIME>now+ti
me
 1430 ENDPROC
 1440 DEFPROCInst
 1450 CLS:PRINTTAB(1,3)"The object of
 the game is to shoot down"'"your opp
onent.Each helicopter has five"''"sho
ts,they can be reloaded by landing"''
"at your own take off point."''" The
 helicopters can accelerate but"''"tu
rn very slowly."'
 1460 PRINT"  Do not fly into the hil
ls."''
 1470 PRINTTAB(16)"GOOD LUCK!"
 1480 PRINTTAB(15,25)"Press space"
 1490 XX=GET
 1500 IFXX<>32THEN1490
 1510 CLS:PRINTTAB(13,3)"LEFT       RI
GHT"'
 1520 PRINT"        UP      A
:"'
 1530 PRINT"        Down    Z
/"'
 1540 PRINT"        Right   C
."'
 1550 PRINT"        Left    X
,"'
 1560 PRINT"        Fire    CTRL    RET
URN"'
 1570 PRINTTAB(11,20)"Or use Joystick
s"
 1580 PRINTTAB(11,25)"Choose(J) or (K
)"
 1590 Z%=GET
 1600 IFZ%<74 OR Z%>75 THEN1590
 1610 ENDPROC
 1620 DEFPROCSet_up
 1630 VDU28,7,3,12,0
 1640 GCOL0,132:CLG
 1650 VDU4:COLOUR129:CLS:COLOUR6:PRIN
T"SHOTS":PRINTTAB(0,1)SHOT%"    "shot
%:VDU5
 1660 GCOL0,3:MOVE0,895:DRAW1279,895
 1670 GCOL0,1:FORPLACE%=10TO290STEP14
0
 1680 MOVEPLACE%,1000:VDU233,232:NEXT
 1690 FORPLACE%=10TO290STEP140:MOVEPL
ACE%,950:VDU233,232:NEXT
 1700 GCOL0,0:FORPLACE%=1150TO860STEP
-140:MOVEPLACE%,1000:VDU230,231:NEXT
 1710 FORPLACE%=1150TO860STEP-140:MOV
EPLACE%,950:VDU230,231:NEXT
 1720 GCOL0,2:MOVE640,0:MOVE340,0:PLO
T85,440,50:MOVE640,0:PLOT85,540,150:M
OVE640,0:PLOT85,590,280:MOVE640,0:PLO
T85,640,300:MOVE640,0:PLOT85,690,280:
MOVE640,0:PLOT85,740,150:MOVE640,0:PL
OT85,840,50:MOVE640,0:PLOT85,940,0
 1730 MOVE0,0:MOVE75,0:PLOT85,50,75:M
OVE0,0:PLOT85,50,100:MOVE0,0:PLOT85,0
,120:MOVE1279,0:MOVE1204,0:PLOT85,122
9,75:MOVE1279,0:PLOT85,1249,100:MOVE1
279,0:PLOT85,1279,120
 1740 ENDPROC
 1750 DEFPROCEnd
 1760 VDU28,0,25,19,0
 1770 *FX15,0
 1780 VDU4:COLOUR132:COLOUR5:PRINTTAB
(5,6)"GAME OVER"
 1790 RESTORE140:PROCTune
 1800 IFLIFE%>life%THENPRINTTAB(6,9)"
RED WON"
 1810 IFlife%>LIFE%THENPRINTTAB(5,9)"
BLACK WON"
 1820 IFLIFE%=life%THENPRINTTAB(6,9)"
A DRAW"
 1830 IFLIFE%>life%THENM%=M%+1
 1840 IFlife%>LIFE%THENN%=N%+1
 1850 PRINTTAB(4,12)"RED "M%" WINS"
 1860 PRINTTAB(4,15)"BLACK "N%" WINS"
 1870 PRINTTAB(2,18)"PRESS 'SPACE' FO
R":PRINTTAB(5,21)"ANOTHER GO."
 1880 PRINTTAB(2,24)"ESCAPE TO RESTAR
T"
 1890 XX=GET
 1900 IFXX<>32 THEN1890
 1910 CLEAR:GOTO180
 1920 ENDPROC
 1930 DEFPROCJoy_one
 1940 IFADVAL(2)>55000:IFy%<24 y%=y%+
4ELSEIFADVAL(2)<10000:IFy%>-24y%=y%-4
 1950 IFADVAL(1)<10000:IFx%<24x%=x%+4
:F%=0:ELSEIFADVAL(1)>55000:IFx%>-24x%
=x%-4:F%=1
 1960 ENDPROC
 1970 DEFPROCKey_one
 1980 IFINKEY(-73):IFy%<24 y%=y%+4ELS
EIFINKEY(-105):IFy%>-24y%=y%-4
 1990 IFINKEY(-104):IFx%<24x%=x%+4:F%
=0ELSEIFINKEY(-103):IFx%>-24x%=x%-4:F
%=1
 2000 ENDPROC
 2010 DEFPROCJoy_two
 2020 IFADVAL(4)>55000:IFb%<24b%=b%+4
ELSEIFADVAL(4)<10000:IFb%>-24b%=b%-4
 2030 IFADVAL(3)<10000:IFa%<24a%=a%+4
:R%=0ELSEIFADVAL(3)>55000:IFa%>-24a%=
a%-4:R%=1
 2040 ENDPROC
 2050 DEFPROCKey_two
 2060 IFINKEY(-66):IFb%<24b%=b%+4ELSE
IFINKEY(-98):IFb%>-24b%=b%-4
 2070 IFINKEY(-83):IFa%<24a%=a%+4:R%=
0ELSEIFINKEY(-67):IFa%>-24a%=a%-4:R%=
1
 2080 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

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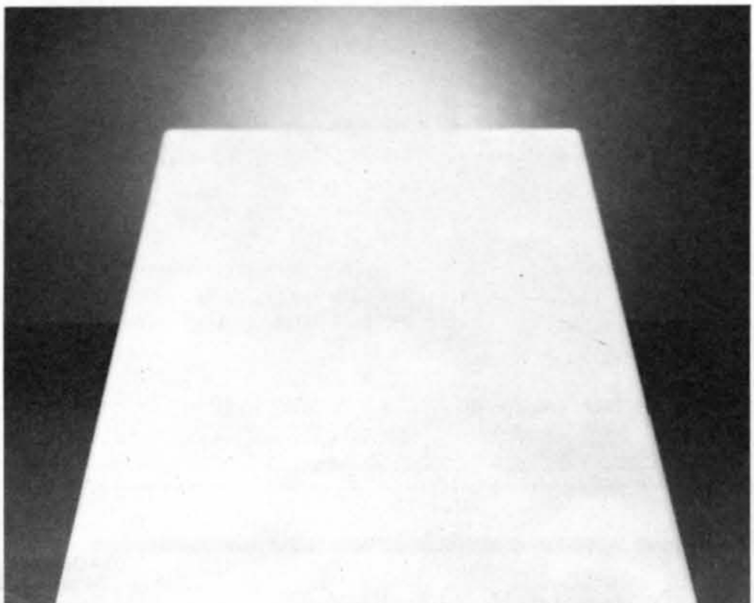

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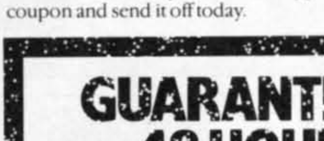

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BU7

Beginners listing

From Page 82

```
to continue."
  510 dummy$ = GET$
  520 ENDPROC
  530 REM ==========================
  540 DEF PROCby_student
  550 CLS
  560 pick$ = ""
  570 PRINT TAB(0,10) "You can
choose:-"
  580 FOR loop% = 1 TO name%
  590 PRINT loop%;: PRINT". "+
name$(loop%)
  600 pick$ = pick$ + CHR$( loop% + 48
)
  610 NEXT loop%
  620 REPEAT
  630 choice% = INSTR( pick$, GET$)
  640 UNTIL choice%
  650 CLS
  660  FOR column% = 1 TO subject%
  670 PRINT TAB( column% * 8, 8)
subject$(column%);
  680 NEXT column%
  690 PRINT 'name$( choice%) ;
  700 FOR loop% = 1 TO subject%
  710 PRINT TAB( loop% * 8 ) mark%(
choice%, loop%);
  720 NEXT loop%
  730 PRINT TAB(0,23) "Press any key
to continue."
  740 dummy$ = GET$
  750 ENDPROC
  760 REM ==========================
  770 DEF PROCby_subject
  780 CLS
  790 pick$ = ""
  800 PRINT TAB(0,10) "You can
choose:-"
  810 FOR loop% = 1 TO subject%
  820 PRINT loop%;: PRINT". "+
subject$(loop%)
  830 pick$ = pick$ + CHR$( loop% + 48
)
  840 NEXT loop%
  850 REPEAT
  860 choice% = INSTR( pick$, GET$)
  870 UNTIL choice%
  880 CLS
  890 PRINT TAB(21, 10) subject$(
choice% )
  900  FOR row% = 1 TO name%
  910 PRINT name$( row% );
  920 PRINT TAB(20) mark%( row%,
choice% )
  930 NEXT row%
  940 PRINT TAB(0,23) "Press any key
to continue."
  950 dummy$ = GET$
  960 ENDPROC
  970 REM ==========================
  980 DATA Tom, Dick, Harry
  990 DATA Maths, English, French,
Physics
 1000 DATA 45,78,30,56
 1010 DATA 34,67,46,84
 1020 DATA 25,89,87,30
```

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Craal listing

From Page 101

```
dungeons and    told not to come back
 without the crown."
  210 PRINT"Here begins the adventure
....."'
  220 GOTO 40
  230 REPEAT
  240 IF R% <> x% THEN GOSUB 590
  250 x% = R%
  260 C%=0:REPEAT: GOSUB 360 : UNTIL
C%<> 0
  270 ON C% GOSUB 790,830,860,910,107
0,590,980,940,1010,1160
  280 UNTIL q%
  290 PRINT
  300 IF o%(8)=1 GOTO 320 ELSE PROCm(
31):PRINT
  310 PROCm(32):PRINT: GOTO 340
  320 PROCm(29):PRINT
  330 PROCm(30): END
  340 PRINT:PROCm(51)
  350 c$ = GET$: IF INSTR("Nn",c$) EN
D ELSE RUN
  360 PRINT "What now?"
  370 REPEAT: INPUT "===>" c$ : UNTIL
 c$<>""
  380 IF LEN(c$)<>1 GOTO 400
  390 C%=INSTR("nsewil",c$): IF C%<>0
 RETURN ELSE PRINT "I don't recognise
 this single letter command - only n,
s,e,w,i,l.":RETURN
  400 S%=INSTR(c$," "): IF S%=0 PRINT
 "I don't understand - put a space be
tween command and object, please.":C%
=0:RETURN
  410 verb$ = LEFT$(c$, S%-1): o$=" "
+MID$(c$,S%+1):REPEAT: o$= RIGHT$(o$,
 LEN(o$)-1): UNTIL LEFT$(o$,1)<>" "
  420 C% = INSTR("droptakesayhit", ve
rb$)
  430 IF C%<>1 AND C%<>5 AND C%<>9 AN
D C%<>12 THEN PRINT "I don't understa
nd your command." :C%=0:RETURN
  440 IF C%=1 C%=7 ELSE IF C%=5 C%=8
ELSE IF C%=12 C%=10 ELSE IF C%=9 RETU
RN
  450 z%=0:I%=1:M%=0: REPEAT
  460 IF LEFT$(o$,4)=LEFT$(j$(I%),4)
THEN M% = 1
  470 I% = I% +1
  480 UNTIL M%=1 OR I%=N% + 1
  490 IF M%=1 z%=I%-1 ELSE PRINT "I d
on't understand the object you mean."
 : C%=0 : RETURN
  500 RETURN
  510 oo$=""
  520 FOR JJ% = 1 TO LEN(hh$)
  530 RR%=ASC(MID$(hh$,JJ%,1)) - 3
  540 IF RR%=38 OR RR%=41 OR RR%=34
RR%=RR%+3
  550 oo$ = oo$ + CHR$(RR%)
  560 NEXT
  570 RETURN
  580 END : ***************
  590 in=TRUE:PROCm(R%-1)
  600 PRINT' "You can see around you
:-"
  610 F%=FALSE
  620 FOR I% = 1 TO N%
  630 IF o%(I%) <> R% THEN GOTO 650 E
LSE F%=TRUE
  640 GOSUB 1380
  650 NEXT I%
  660 IF NOT F% PRINT"Nothing of inte
rest."
  670 PRINT
  680 RETURN
  690 DATA 0,0,0,0
  700 DATA 3,9,0,0
  710 DATA 0,2,4,0
  720 DATA 0,0,5,3
  730 DATA 0,0,0,4
  740 DATA 0,7,0,0
  750 DATA 6,0,0,8
  760 DATA 0,0,7,9
  770 DATA 2,0,8,0
  780 DATA 0,0,0,0
  790 IF d%(R%,1) = 0 PRINT " Not all
owed"': RETURN
  800 IF R% = 7 AND a% THEN PROCm(33)
:PRINT: RETURN
  810 R% = d%(R%,1)
  820 RETURN
  830 IF d%(R%,2) = 0 PRINT " Not all
owed"': RETURN
  840 R% = d%(R%,2)
  850 RETURN
  860 IF d%(R%,3) = 0 PRINT " Not all
owed"': RETURN
  870 IF d%(R%,3) = 8 AND f% THEN PRO
Cm(34):PRINT: f%=FALSE
  880 IF d%(R%,3) = 7 AND o%(7) = 0 T
HEN o%(7)=8: PROCm(35):PRINT
  890 R% = d%(R%,3)
  900 RETURN
  910 IF d%(R%,4) = 0 PRINT " Not all
owed"': RETURN
  920 R% = d%(R%,4)
  930 RETURN
  940 IF o%(z%)=1 PRINT"You already h
ave it" : RETURN
  950 IF o%(z%)<> R% PRINT"It's not h
ere": RETURN
  960 IF z% < T% PRINT"You can't take
 that" ELSE o%(z%)=1
  970 RETURN
  980 IF o%(z%)=1 o%(z%) = R% ELSE PR
INT "You don't have it": RETURN
  990 ON (R%-1) GOSUB 1230,1250,1240,
1290,1240,1240,1310,1240,1240
 1000 RETURN
 1010 h$="": FOR I% = LEN(o$) TO 1 ST
EP -1
 1020 h$=h$+MID$(o$,I%,1)
 1030 NEXT I%
 1040 IF o$ = h$ THEN q% = TRUE :PROC
m(50): RETURN
 1050 PRINT "Okay," + CHR$(34) + o$ +
CHR$(34)
 1060 RETURN
 1070 PRINT ' "Your inventory contain
s:-"
 1080 F% = FALSE
 1090 FOR I%= T% TO N%
 1100 IF o%(I%)<>1 THEN GOTO 1120 ELS
E F%=TRUE
 1110 GOSUB 1380
 1120 NEXT I%
 1130 IF NOT F% PRINT"Nothing at all.
"
 1140 PRINT
 1150 RETURN
 1160 IF o%(z%)<> R% PRINT"It wasn't
here to hit": RETURN
 1170 IF o%(11)<>1 PROCm(36): RETURN
 1180 IF z%<>6 AND z%<>3 PRINT "This
has no effect whatsoever."
 1190 IF z%=6 AND a% THEN a%=FALSE: P
ROCm(37):PRINT: o%(6)=0: RETURN
 1200 IF z%=3 AND s% = FALSE THEN PRO
Cm(38):PRINT".": s% = TRUE: o%(8) = 2
 : RETURN
 1210 IF z%=3 AND s% = TRUE PROCm(39)
 : RETURN
 1220 RETURN
 1230 IF z% = 8 AND e% THEN PROCm(40)
:PRINT: o%(z%) = 0: e% = NOT e%:o%(11
) = 1
 1240 RETURN
 1250 IF z% = 7 AND NOT b% AND l% THE
N PROCm(41):PRINT: l%=FALSE
 1260 IF z%=9 PROCm(42): o%(z%)=0:o%(
12) = 3
 1270 IF z% = 10 THEN d% = FALSE
 1280 RETURN
 1290 IF o%(7) = 5 AND o%(12) = 5 THE
N PROCm(43): b% = FALSE: o%(12) = 0:o
%(7) = 1
 1300 RETURN
 1310 IF z%<> 10 GOTO 1350
 1320 IFd% THEN PROCm(44):GOTO 340
 1330 IF ( NOT l%) OR (o%(7)<>8 AND o
%(7)<>1) THEN PROCm(45): GOTO 340
 1340 IF o%(2)=0 PROCm(46):o%(1)=0:o%
(2)=8:o%(8)=8
 1350 IF z%=7 AND NOT b% THEN l%=TRUE
: PROCm(47):PRINT
```

→

Craal listing

From Page 151

```
 1360 IF z%=9 OR z%=12 THEN PROCm(48)
:PRINT:PROCm(49): GOTO 340
 1370 RETURN
 1380 PRINT "A "; j$(I%);" ";
 1390 IF I%=1 PROCm(10)
 1400 IF I%=2 PROCm(11)
 1410 IF I%=3 AND NOT s% PROCm(12)
 1420 IF I%=3 AND s% PROCm(14)
 1430 IF I%=4 PROCm(15):PRINT: PROCm(
16):PRINT: PROCm(17)
 1440 IF I%=5 PROCm(18)
 1450 IF I%=6 PROCm(19)
 1460 IF I%=7 AND NOT b% AND NOT 1% P
ROCm(21)
 1470 IF I%=7 AND NOT b% AND 1% PROCm
(22)
 1480 IF I%=7 AND b% PROCm(23)
 1490 IF I%=8 PROCm(20)
 1500 IF I%=9 PROCm(24)
 1510 IF I%=10 AND d% PROCm(25)
 1520 IF I%=10 AND NOT d% PROCm(28)
 1530 IF I%=11 AND NOT a% PROCm(26)
 1540 IF I%=12 PROCm(27)
 1550 PRINT
 1560 RETURN
 1570 DATA iluh,;,sloh#ri#dvkhv,3,yhq
glqj#pdfklqh,5,pluuru,9,wuroo,8,gzdui
,:,odps,3,frlq,3,sdufkphqw,7,fxuwdlq,
<,vzrug,3,yrxfkhu,3
 1580 DATA "d#udwkhu#vsduvh,#xqiulhqg
o|##urrp#zlwk#wkh#dssduhqwo|#lqh{solf
deoh###vljq#*Duprxu|*#rq#wkh#zdoo1"
 1590 DATA "d#ydvw#fdyhuq#zlwk#d#oduj
h###srro#ri#zdwhu1#D#sdwk#ohdgv#dorqj
#lwv###hgjh1"
 1600 DATA "dq#h{wuhpho|#wljkw,#Hdvw#
0###Zhvw#wxqqho1"
 1610 DATA "d#vkrs1#Ryhu#wkh#frxqwhu#
lv#dvljq=#Hehqhh}hu*v#Hqwhusulvhv1"
 1620 DATA "d#vpdoo#fkdpehu,#lwv#zdoo
v###lulghvfhqw#zlwk#vsdunolqj#fu|vwdo
v,vdyh#rqh1"
 1630 DATA "d#udwkhu#jorrp|#fdyh,####
####uhplqlvfhqw#ri#rog#plqh#zrunlqjv1"
 1640 DATA "zkdw#orrnv#olnh#d#khuplw*
v###fhoo1"
 1650 DATA "dq#rog#gluw|#fkdpehu#wkdw
####orrnv#wr#kdyh#ehhq#sloodjhg#orqj#
djr1"
 1660 DATA "#wkh#zl}dug*v#fkdpehu1#Dv
#qr#rqh#kdv#hyhu#vxuylyhq#wklv#h{shul
hqfh,##wkhuh#lv#qr#h{wdqw#ghvfulswlrq
1111"
 1670 DATA "exuqlqj#eulooldqwo|#lq#d#
frughu1"
 1680 DATA "qrz#txlwh#frro1"
 1690 DATA "zlwk#d#qrwlfh##*qr#krw#prq
h|#ru#frxqwhuihlw#frlqv*1"
 1700 DATA "zlwk#d#qrwlfh##*hpsw|*#rq#
lw1"
 1710 DATA "lq#elwv#rq#wkh#iorru1"
 1720 DATA "hqjudyhg="
 1730 DATA "*Vd|#pluuru#zrug#wr#zl}du
g#phhw,"
 1740 DATA "Eh#vxuh#|rx#kdyh#wkh#jrog
#wr#juhhw1*"
 1750 DATA "zlwk#d#exvlqhvv#olnh#dlu1"
 1760 DATA "zhdulqj#gdun#jodvvhv1"
 1770 DATA "zruwk#lwv#zhljkw#lq#jrog1"
 1780 DATA "qrw#|hw#olw1"
 1790 DATA "exuqlqj#euljkwo|1"
 1800 DATA "lq#d#udwkhu#edwwhuhg#frqg
lwlrq1"
 1810 DATA "qu|#dv#d#erqh#dqg#frpsohw
ho|#eodqn1"
 1820 DATA "lq#txlwh#jrrg#frqglwlrq#0
```

PENMAN
ALL MY OWN WORK
Penman
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghi
0123456789::<=>?@()-!-#$%&·()*+
Suddenly,
quality plotting
is within reach of
every computer user...

```
#dqg#qrw#dw#doo#gdps1"
 1830 DATA "fryhuhg#lq#eorrg1"
 1840 DATA "uhdglqj=#H{fkdqjh#wklv#yr
xfkhuwrjhwkhu#zlwk#dq#rog#odps#dqg#|r
x*oo####jhw#d#qhz#odps#iuhh$"
 1850 DATA ",#zulqjlqj#zhw1"
 1860 DATA "Wkh#zl}dug*v#h|hv#oljkw#x
s1#Kh#wdnhv####|rxu#frlq#wr#ex|#klpvh
oi#d#gulqn#dqg####glvdsshduv1"
 1870 DATA "\rx#sxw#rq#wkh#furzq#kh*v
#ohiw#ehklqg###dqg#ilqg#|rxuvhoi#edfn
#lq#wkh#sdodfh,###Nlqj#ri#Fuddo,#dqg#
kdss|#hyhu#diwhu1"
 1880 DATA "Rk#ghdu,#|rx*yh#jrw#qr#pr
qh|#0#dqg#wkh##zl}dug#zdv##krslqj##|r
x*g#ex|#klp#d#####slqw#ru#wzr1"
 1890 DATA"Qdwxudoo|#kh#nloov#|rx1"
 1900 DATA "Wkh#gzdui#uhixvhv#wr#ohw#
|rx#sdvw1"
 1910 DATA "D#zrug#wr#wkh#zlvh=#\rx*u
h#jrlqj#wr#wkh#rqo|#urrp#lq#wkh#sodfh
#zlwkrxw#lwv#rzq##qdwxudo#skrvskruhvf
hqfh1"
 1920 DATA "Dq#ludwh#gzdui,#lqixuldwh
g#e|#wkh#oljkw#|rx*yh#ohw#lq,#wkurzv#
klv#xqolw#odps#dw#|rx1#Lw#odqgv,#lq#w
kh#urrp#|rx*yh#mxvw##ohiw,#vkdwwhuhg1
"
 1930 DATA "\rx#kdyhq*w#jrw#dq|wklqj#
ghfhqw#wr#klw##zlwk1#Jhw#d#vzrug1"
 1940 DATA "Wkh#gzdui#idoov#ghdg,#wkh
q#glvdsshduv#lqiurqw#ri#|rxu#h|hv1"
 1950 DATA "Wkh#yhqglqj#pdfklqh#vkdww
huv1#D#frlq####gursv#rxw"
 1960 DATA "Judwxlwrxv#ylrohqfh#grhvq
*w#khos#dq|rqh1"
 1970 DATA "Wkh#frlq#idoov#lqwr#wkh#v
orw#lq#wkh#####yhqglqj#pdfklqh1#\rx#d
uh#jlyhq#d#vzrug1#Wkdw*v#zk|#lw*v#fdo
ohg#wkh#Duprxu|$"
 1980 DATA "Xqiruwxqdwho|,#|rxu#odps#
jrhv#rxw1"
 1990 DATA "Lqwhuhvwlqj$#Vrphwklqj*v#
kdsshqlqj#wr###wkh#sdufkphqw1#Wdnh#d#
orrn1111"
 2000 DATA "\rx*yh#jrw#d#qhz#odps$"
 2010 DATA "Wkh#fxuwdlq#ioduhv#xs1#\r
x#glh#lq#wkh###eod}h1"
 2020 DATA "Wdnlqj#dgydqwdjh#ri#wkh#v
xgghq#soxqjh###lqwr#gdunqhvv,#wkh#gzd
ui#iurp#qh{w#grru#frphv#lq#dqg#srolvk
hv#|rx#rii1"
 2030 DATA "Wkh#iluh#jrhv#rxw1#\rx#vh
h#d#frlq#lq#lwvdvkhv1"
 2040 DATA "\rxu#odps#oljkwv1"
 2050 DATA "Lw#exuvwv#lqwr#iodph$"
 2060 DATA "\rx#vxgghqo|#uhdolvh#wkdw
#lw#zdv#ylwdo##wr#wkh#jdph1#Ryhufrph#
zlwk#julhi,#|rx###nloo#|rxuvhoi1"
 2070 DATA "Wkh#pluuru#glvvroyhv#dqg#
|rx#ilqg######|rxuvhoi#sxoohg#wkurxj
k#wkh#jds#lw*v###ohiw#lqwr#wkh#zl}du
g*v#urrp1"
 2080 DATA "Zkdw#d#vkdph#0#dqg#|rx#zh
uh#grlqj#vr####zhoo#wrr1#Gr#|rx#zdqw#
dqrwkhu#jrB#+\2Q)"
 2090 DEF PROCm(m)
 2100 hh$=m$(m):GOSUB 510
 2110 IF in PRINT"You are in ";oo$; E
LSE PRINToo$;
 2120 in = FALSE
 2130 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

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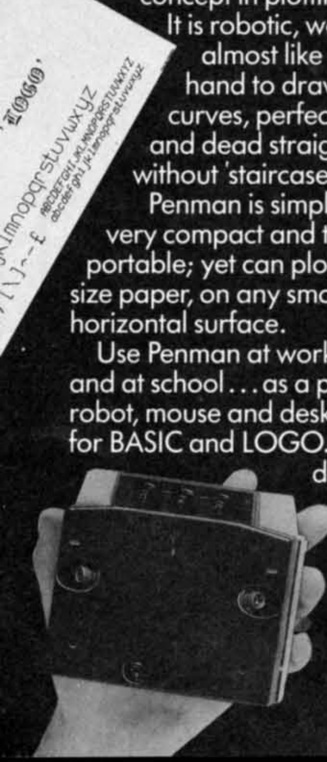

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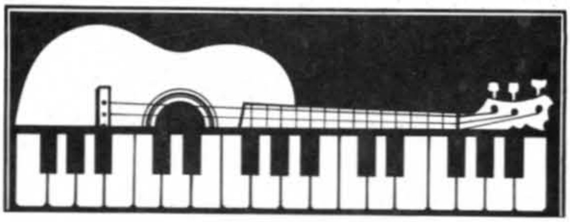

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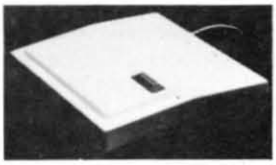

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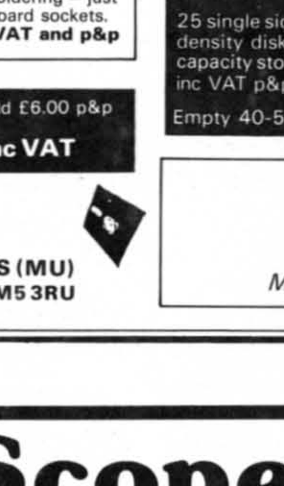

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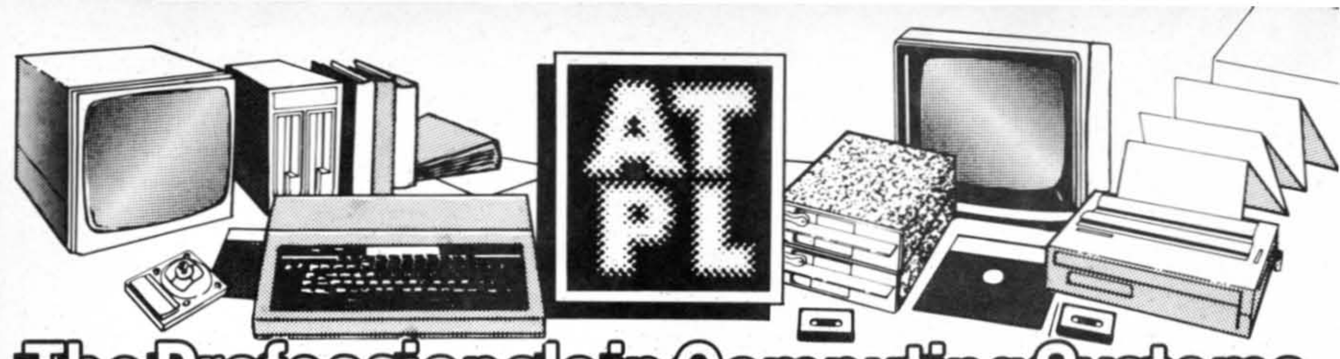

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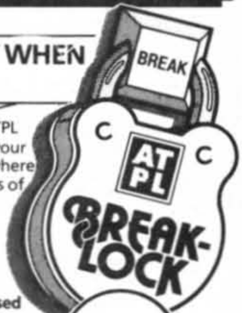

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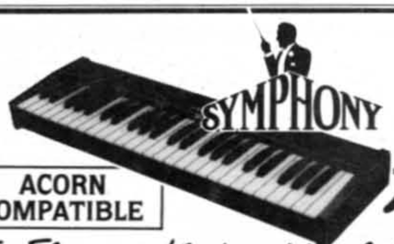

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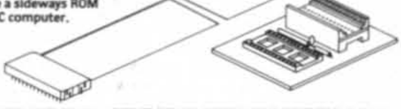

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Help me start the dice rolling!

PLEASE can I appeal to your readers, to help close a big gap that exists in my computer programming.

Gambling!

I don't mean horse racing games, but the serious business of betting on the outcome of a real live race.

With the weight-for-age-scale existing in racing, surely a program must be available that tries to beat the system.

In the national press, Computorman and Computorkid are obviously working from some sort of program. If enough information can be put into a program, a guide as to likely winners must be forthcoming.

In roulette, again systems like the Martingale and half Martingale have been around for years but no-one seems to be interested in putting them into a serious computer program.

The obvious program that could make money would be a system – if that is the word – to crack the weekly football pools. Again, if the punter could put enough information in a result might be found.

Anyway if there are any programs around on these subjects, and if they require a tester, do not hesitate to contact me. I would give generous commissions on winnings!

I hope this starts the dice rolling. – **David S. Jenkins, Port Talbot, W. Glamorgan.**

● We know of a pools program by Hartland Software designed to assist in selecting a winning entry. As regards systems for the other sports perhaps some of our readers can help.

Jim saves me 8 hours

WHEN the August edition of your excellent publication arrived I was in the middle of writing a teletext editor program.

After reading through Jim Notman's version TEDITOR, I discovered that this was the program I was trying to write.

I typed in this version and saved myself hours of writing and debugging. Many thanks for another excellent free program.

Your readers who like myself, own a printer and a Computer Concepts Printmaster ROM may like to amend the program as follows to give a graphics dump of their Teletext creations:

```
 920 PRINT "Command (L,S,C
,I,D,W,B,E,N,P,?)";
 930 G%=INSTR(EeSsLl?/BbCc
WwIiDdMmPp",GET$):G%=(G%+1)
DIV2
 950 ON G% GOTO 1080,960,9
70,980,990,1000,1010,1020,1
030,1040,1045 ELSE 920
1045 PROCprint:GOTO1050
2070 DEFPROCprint
2072 PROCclear:IF trans=FA
LSE PROCtomen(screen):trans
=TRUE
2074 *GDUMP
2076 ENDPROC
```

I hope your readers find this facility useful. Thanks again for a great magazine and good luck for the future. – **Alan Rowley, Eastwood, Nottingham.**

A mammoth problem!

I HAVE a BBC OS 1.20 with a Scribe word processor program running into a Quen-Data daisywheel printer.

My problem is that the printer can produce proportional spacing but to do so I need to insert all the Esc control codes manually and then try to even up the right hand justification. On any document other than a short letter this would be a mammoth task!

The View printer driver will not produce proportional spacing and there appears to be a dearth of drivers in the advertisement pages.

Is there a commercial printer driver that could do this and be accessible from Scribe, or do you know a routine that will do the job?

Can any reader help? – **Manek Dubash, London SW2.**

Jumping in and out

HOW does one escape from an error within a loop? For example:

```
10 FOR X=-1 TO 1 STEP 1
20 PRINT SQR(X)
30 NEXT
```

Obviously the search program is rather different, but recourse to ON ERROR causes the micro the forget the FOR, and I see no way round it.

It may be germane to add I have a smattering of assembly but as yet have failed to reach a proper understanding of BRK. – **F.G. Balcombe, Goffs Oak, Waltham Cross Herts.**

● Sorry! You can't jump back into a loop as this will eventually cause another error. Jumping in and out of loops is considered to be very bad programming. This is because the Basic stack which remembers the level of nesting is corrupted.

Secrets unearthed

I HAVE been digging around in some of the most respectable games available for the BBC Micro. I have found a number of secrets held by these that your readers might like to know about.

The following games can all have their number of lives increased together with the level of play by a simple one line command incorporated into a loader program.

As you can probably see, once you have got the address of the lives you can bet that the level is not far away.

Game	*Lives*	*Level*
Arcadians	*& 4EBE*	*& 4EC8*
Cybertron Mission	*& 1A06*	*& 1A16*
Planetoid	*& 276B*	*& 2771*
Snapper	*& FDD*	*& FCD*
Meteors	*& 1711*	*& 170C*
Monsters	*& 1F04*	*Unknown*
Chuckie Egg	*& 2BFD*	*& 2BF9*
Killer Gorilla	*& 1138*	*& 113C*

To use this effectively you must write a loader program situated well away from where the main program loads, for example PAGE = &6000. This loader program must be situated just after all the introductory parts to the game but just before the main part.

It must first load in the machine code part, download it – if you have discs only – and then ask for the lives and level. It can then alter the registers by a simple line like this Chuckie Egg for example:

```
?&2BFD=(number of lives)
?&2BF9=(level you want)
```

*The program must then be called to its starting address. This can be found easily by *INFO on discs or *OPT 1,2 on tape.*

I have also found a way of speeding up two of Doug Anderson's games, Cylon Attack and Chuckie Egg. (Poor old Chuckie is getting a right

→

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bashing isn't it?)

Just before chaining either of these two games type in as a direct command:

```
?&FE45=21:?FE46=21 <CR>
```

The speed increase in Cylon Attack is quite astonishing and gives the game an added interest to those who have decided that Cylon is too easy at its current speed.

These are as far as I know the only two games that can be quickened up in this way, but if like me you prefer to play at a more leisurely pace most games can be given a drag factor by experimenting with the numbers used.

Any number less than 14 will probably slow the game down but if you enter 0 then the micro will not even listen to what you say as it has seized up completely.

So come on all you out there, get digging into those games of yours. – **P.V. Lewis, Morriston, Swansea.**

'Bad Key' explained

COULD you tell me something about the "Bad Key" error I get sometimes when typing in a function key program.

I can find nothing about it in the User Guide. – **James Robinson, Stockton, Rugby.**

● The Bad Key error message is produced when you try to define a function key which has a number outside the range 0-15. The following line will cause this error:

```
*KEY 20 LIST ¦M
```

Keys 11 to 15 are the cursor and copy keys and can be programmed as normal function keys after a *FX 4,2 command.

Olympic records?

YOU are running a great magazine and you made a great game – Micro Olympics – although I do think playing it too much does ruin the keys.

Here are some of my records:

100m	*8.00 secs.*
200m	*20.41 secs.*
400m	*42.14 secs.*
800m	*1:37.70 secs.*
1500	*3:17.21 secs.*
(Done by Ken, my brother-in-law)	
Javelin	*100.53m*
Discus	*72.47m*
Hammer	*77.22m*
Long Jump	*8.26m*
High Jump	*2.39m*
Pole Vault	*2.00m*

Please could you try making a small keyboard extension to fit in the back of the micro to save wear on the BBC's keyboard? – **Keith Harding, Milton Keynes.**

● A keyboard extension is on the cards for publication in a few months' time.

More lives on Frak

I THOUGH you might be interested in the following upgrades for the game Frak. It has got to be one of the most intriguing and original games ever written for the BBC Micro, and I hope that other software houses will see what can be done, and follow suit.

The following gives you 255 lives:

```
*LOAD Frak2
?&305B=&FF
CALL &46BA
```

The following enables you to boot into the different screens by pressing Esc:

```
*LOAD frak2
?&304D=1
CALL &46BA
```

I hope that this will help Frak-freaks to get more out of their game. – **David Machin, Burton, Stoke-on-Trent.**

*HON and *HOFF

*WHEN downloading programs from Ceefax and listing them, I have found two commands which I can't find documented anywhere. They are *HON and *HOFF.* – **N.A. Turner, Whitstable, Kent.**

● We have consulted our experts and the general opinion is that the commands are part of a program in the Teletext ROM.

ON ERROR is unsuitable

WHILE running a program I was trying to disable Esc.

I usually control Esc by the command ON ERROR, but I have found it unsuitable, until I used the command ***FX14,6.**

This totally disabled the Esc but how do I restore after a program has been run? — **Derek Talbot, London SW1.**

● Esc can be disabled and enabled by a single *FX command. If you type ***FX229,1** Esc will have no

Can I get my program back?

I AM a novice programmer on my BBC Model B and when putting what were to be the final touches to a taped program which had taken weeks to develop I had the misfortune to wipe off the first seven blocks.

Lower down the tape is a slightly shorter version of the program at an earlier modification standard. The changes introduced into the later version were for the most part in the middle and final stages.

Thus, the first seven and eight blocks of the earlier program will contain only minor differences from the blocks I wiped off the later version.

Following the advice of a sympathetic fellow BBC Micro user I have tried loading the earlier version up to block eight which is the first number appearing on the screen when vainly trying to load the later version.

Then I stop the tape and fast-forward to the threshold of the accident and hope that loading will continue from that same block number when reverting to normal speed.

But so far without success.

The cursor returns to the ready position on reaching the end (somewhere in block 28) but when trying to run or load the error message "Bad Program" appears.

Sometimes I can get through this process without intermediary messages like "Data" or "Rewind Tape" but I can't get past the "Bad Program" message at the end.

Am I likely to succeed hoping to hit the right coincidence of tape stop and restart, or am I wasting my time?

If so is there some other way I can pick up this "head-less" program and stuff it back into the memory from where I can save it again and subsequently merge it with the beginning of the earlier program?

I'm sure everyone must have experienced this sort of disaster at some time or other. Does everyone resignedly sit down again for weeks rewriting the wretched thing? – **John P. Unsworth, Southport, Lancs.**

● I'm afraid to tell you that it is not possible to recover all of your program. This is because the two versions are different.

The "Bad Program" error message will be printed when the current Basic text does not "link" together.

For example, if the end of block eight contains only half of a Basic line then the micro must have the rest of the line to "link" the program correctly.

If the line is not completed in block nine of the other program then the Basic interpreter will consider all of the program to be "rubbish". This then produces the "Bad Program" error message.

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

effect. ***FX229,0** will restore the key's effect.

Processor points

I AM pleased to see you are including articles on the 6502 second processor. I offer the following points related to the second processor article by Mike Harrison in the December issue of The Micro User.

On page 151 it is stated that the flag indicating whether the DFS is active or not is located at &DF0. The actual location depends on which socket the DNFS chip is in, as implied but not made clear in the second paragraph on page 152.

The last digit of the location address is the socket number of the DNFS ROM, that is, if the DNFS ROM is in socket 13 then the flag byte is located at &DFD and so on.

As stated, bit 6 of this byte indicates whether the DFS is active. Additionally bit 7 indicates whether the NFS is active. In each case bit set indicates filing system disabled.

Each of these bits may be set or reset separately to deactivate or reactivate the separate filing systems when Break is next pressed. The flag settings will survive until power-down unless explicitly changed.

With both filing systems' hardware present, the DNFS ROM normally powers-up in DFS but this is changed to NFS on power-up (or Ctrl-Break) if the leftmost link of the eight at the bottom right of the keyboard is made.

*Adding to ROM compatibility on Page 153, Computer Concepts' graphics ROM is almost fully compatible with the 6502 second processor in that all commands except *GFX work.*

However variable parameters have to be sent via the OSCLI command. This also applies to variable parameters sent to Printmaster or any other ROM which uses the 'known' locations of A% ... Z%.

An 'upgraded' Disc Doctor is available which allows all commands to work correctly with the second processor, although memory commands still refer to memory in the I/O processor.

Computer Concepts have an information sheet which explains the current compatibility position between their ROMs and the second processors, and gives examples of the OSCLI technique mentioned above. – **A.R. Hunter, Acklam, Middlesbrough.**

. . . and a minor bug

THANKS once again for your excellent second processor series.

As you probably know already, a minor bug has crept in – easy enough to make if you follow the data sheets.

The group 8 instructions on page 138 of the October 1984 issue of The Micro User do not work as you suggest.

TRB and TSB affect the Z flag only. Z is set to reflect the result of A AND M (where M is memory). The accumulator is unaffected.

Of course, this means your standard 6502 "translations" will have to be radically altered. – **Stuart Morris, Liverpool.**

BBtype package

I WAS most interested to read the comments of your reviewer Chris Chan of our BBtype text processing package and would make the following observations:

☐ *Printing is only performed in graphics mode for some of the special characters, thus the great majority of printing is carried out at full printer speed.*

☐ *Although we only guarantee BBtype to work with genuine Acorn equipment, we also have had successful results reported by users with the Opus DFS also.*

☐ *Truly Epson-compatible printers, such as Canon and Kaga/Taxan will also work with BBtype.*

☐ *BBtype will accept as input files from View and Wordwise, though I agree that this facility is very limited owing to the differing methods used to store text. A specific advantage of the BBtype method is that it permits the viewing of one text file while editing another.*

However, to overcome the frustrations of users who wish to have the best of both the View/Wordwise and BBtype worlds, we have produced much more comprehensive conversion utility programs which are available from us at a nominal cost upon request.

☐ *The main market for BBtype is schools and colleges where the product has achieved a very high degree of acceptance. I am sure that foreign language teachers would take great exception to your reviewer's comment about "deep knowledge of their language".*

These shamefully neglected people have real text-processing problems for which BBtype provides a cheap and effective solution for the production of examination papers, student notes and so on.

☐ *BBtype already works on 6502 second processors. In addition, our latest version now works on Econet and provides a far cheaper means of introducing pupils to the basics of text processing than any of the current ROM-based products in the marketplace.*

☐ *Although by no means such a comprehensive word-processor as View or Wordwise, BBtype does do its simple job well, in our opinion, by concentrating on "what you see is what you get".*

Naturally, we are developing it in order to add more sophisticated features – I am my own sternest critic of its shortcomings – but our prime consideration is to keep it simple.

In conclusion, thank you for reviewing BBtype: constructive criticism is always welcome. – **Simon Furey, Furey Enterprise Products, Marlborough, Wilts.**

● We thank Simon for taking the trouble to provide this additional information, which enhances what was a comprehensive review of his product in the November issue of *The Micro User*.

Better CATALOG

THREE small changes will improve the effectiveness of CATALOG, published in your December issue.

If any of the menu options is selected after calling the alternative drive, the original program reverts to drive 0, and attempts to satisfy the demand from there.

This can be avoided by changing line 620 to read:

```
 620 S$=":"+STR$(DN%)+"."+
CAT$(PC%/10):ENDPROC
```

The same menu option (N) can be used to select any drive by changing line 660 to read:

```
 660 REPEAT:PRINTTAB(9,8)C
HR$141CHR$130"which drive?"
:PRINTTAB(9,9)CHR$141CHR$13
0"WHICH DRIVE?":D%=GET:DN%=
DN%-48:UNTIL DN%>=0 AND DN%
<4
```

*Finally, the inclusion of *FX3,2 before line 680, and of *FX3,0 before leaving the PROCedure prevents the transient display of the new disc catalogue before the fresh menu is displayed.* – **Peter Howard, Church Crookham, Hants.**

3D graphics

I HAVE just completed writing a three dimensional animated graphics program for the BBC Micro. My intention is to use this as part of a flight simulator program to generate a picture of the view seen from the aircraft cockpit.

The program allows three translational degrees of freedom along cartesian axes, and three rotational degrees of freedom about the same axes.

The axes are fixed to and move with the observer, that is, the aircraft. Full 0 to 360 degrees of rotation are allowed in each direction.

In order to generate screen

→

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coordinates from actual earth-fixed coordinates the projection of each point on a plane normal to the axis of rotation is found and then rotated through the appropriate angle.

This is repeated three times for each point: once about each axis.

To find the correct projections involves the use of arctangent, and to rotate them the use of square root. This is of course a slow process, especially in Basic so I have written the whole program in assembly language and accessed the Basic ROM routines for ATN and SQR directly.

However I have still not achieved the speed I require and am now thinking in terms of using the 6502 second processor.

Is it at all possible to access the built in routines for ATN and SQR when using the second processor? If so where are the entry points?

Assuming that this is somehow possible, how much increase in speed might I expect to achieve? – **S.J. Stewart, UMIST, Manchester.**

● You can access the Basic ROM routines when you are using the 6502 second processor. If you use HI-Basic – a relocated version of Basic II with modifications – you will have to calculate the new action address for the function you require.

If you are not using HI-Basic the calls remain at the same address – this is because the ROM version of Basic is copied into the RAM of the second processor.

The speed increase is hard to estimate. It will be at least 30 per cent faster and could be as much as 200 per cent faster.

You must be very careful using ROM routines because each version of Basic has a different action address for inbuilt routines.

HERE are some quickies from The Micro User's own bulletin board, Microweb:

DOES anyone know how to make a Panasonic portable TV into a monitor/TV? Is it possible? – **Alan Barry, Manchester.**

● Sell it and use the money towards a real monitor.

*I'VE had my monitor for two months now and am fed up with typing *TV,1 to turn off the interlacing. Is it possible to modify the Beeb so that the interlacing is always off?* – **Stephen Carlin, Glasgow.**

● Put the command in a disc boot up file or sideways ROM – bit of a waste of 8k though.

HOW do I scan the analogue ports and leave the result on a file on disc or tape? – **Dominic Purdue, Newcastle-on-Tyne.**

● Read the analogue value with an ADVAL command and then store it on a file with a PRINT # command. See page 328 of your User guide.

IS it possible to use output from the modem to simulate dialling? I have a Nightingale modem. – **Alex Macklen, Truro.**

● Yes it is possible to simulate dialling using three relays connected to the user port. Unfortunately it is illegal.

HOW do you change the acoustic modem in The Micro User to be used as an on-line modem? – **Jim James, Grays.**

● If you need to ask, you can't do it. Anyway it's illegal.

IS there any electrical difference between turning the Beeb off at the mains and by its own on/off switch? My on/off switch is rather inaccessible. – **Ian Hanby, Cotgrave.**

● No electrical difference, so you can turn it off at the mains.

Editing records

I AM having problems writing a sensible routine to easily and conveniently edit records.

What I have is a routine that prints the current version of the record – field by field – on the screen and then prompts for the new version of the field to be INPUTted one line below.

If no alteration is to be made to a particular field then it must be copied using the cursor and copy keys.

*If I only wish to alter one field I have to copy the other 13, which is not exactly perfect even when the cursor key speed is increased with *FX12 and *FX11.*

What I want is a way of printing the record on the screen, allowing cursor key editing of any field actually altering what is displayed on the screen (overwriting the original field), followed by some way of reading what is then on the screen in the set places allocated to each field and obtaining the data from that.

In this way only the field(s) that need altering is/are retyped, the rest are merely 'reread' from the screen.

Can you or anyone else help me?

Can this be done in a way that is compatible with the second processor and if so how? – **W.M. Brown, Poole, Dorset.**

● The easiest way to solve your problem is to leave a record unchanged if a null string is entered.

This means that if just Return is pressed when the new record is requested then the old record's value is left unchanged. The short program below shows how this can be done.

```
   10 old$="CONWAY"
   20 INPUT "Enter new titl
e",new$
   30 IF new$<>"" THEN old$
=new$
   40 REM Rest of program
```

Line 30 tests to see if a "Blank" string was entered. If a blank string is entered then the old string will be left alone. If a string is entered the old string is changed to the new string.

It is much easier than using some sort of on-screen editor as you described.

Good value

I HAVE just purchased Mini Office and within 15 minutes I have discovered what excellent value for money this program is. No wonder it is appearing high in the computer charts!

I am used to using an Apple IIe at work and these programs have some features not found in many professional programs.

For example, the zero routine on the spreadsheet allowing the user to delete all values leaving labels and formula intact and the warning signal when you are about to enter a value over a formula.

Fantastic – let's have more good value software of this quality. – **David Holland, Buxton, Derbys.**

Good service

AT a time when too many people, and some universities, are squandering the county's resources on imported manufactured products it is a pleasure to report that I have had perfectly reliable service from three excellent British made – and I don't mean British boxed – peripherals to the BBC Micro.

These are the Walters WM2000 dot matrix printer, *very sturdy and very fast, the medium resolution Microvitec colour monitor, and the new Tech OP Tracker 2, a dual, double-sided 5¼in disc drive, designed and manufactured by Data Track Technology.*

Incidentally if anyone is interested in screen dumps for the WM2000, send me an SAE and I will send details of the dumps I can supply. – **Dr A.R. Cownie, 7 Chatsworth Road, Broadoak Park, Worsley, Manchester M28 4NU.**

Cry from the bar

DO you or any of your readers know of a tape program suitable for pub management which includes VAT, stock control, takings, calculation of profit.

I would be most grateful if you could publish my letter as using the Beeb would save a great deal of time. – **Charles Thackeray, The Old Ship Inn, Bridgwater, Somerset.**

Missing sector

HELP! I have fitted a disc interface as you explained in the January issue of The Micro User.

I found a whole new world of DFS commands and filled my first disc. Fantastic!

Next morning I switched on all ready to go again and ... "Disc Error 18 at 00/00".

The only trouble is the same disc works in another drive with another micro and the same drive works perfectly well with another micro. Disc and drive together work perfectly with another micro.

I deduce the fault must lie with my disc interface. Logic suggests the disc controller or the DFS.

I have swapped them both for chips which I know work properly. Result – my micro still shouts out "Disc error 18 at 00/00".

What can I have done wrong bearing in mind that the interface did work immediately after the upgrade?

My micro is a Model B with issue 3 board. Neither my new double sided disc drive nor a friend's single drive will work with my micro.

I have re-read your article so many times that I know it from memory and I'm sure I did everything just as you explained it.

I'd appreciate any advice you can offer. – **John Schofield, Glossop, Derbys.**

● Disc error 18 is given when the micro cannot find a sector. The numbers after it indicate the track and sector number it is looking for. Your error message seems to indicate you cannot read the directory track.

As the interface worked for a time after you had completed the upgrade I am sure you have not done anything wrong.

However check carefully that all the ICs you have added are in their sockets properly and there is not one with a leg bent underneath the body.

This could make contact for some time and then work free leaving you with a faulty micro.

Alternatively one of the data separation chips in the disc interface circuit could be faulty or you have a faulty cable – did you swap this as well as the drive?

Failing that your micro will have to be examined using the correct test gear to find out what is wrong.

Harpsichord envelope

I AM writing in the hope that I can help J. Allison in his/her search for a harpsichord envelope – see November's Micromail.

One of the drawbacks with the BBC's sound chip is the fact that it only produces one type of waveform – a somewhat distorted square wave. Two main factors go to make up a sound: the timbre or waveform and the ADSR envelope.

In the lower registers, the square wave sounds rather like a clarinet and higher up it can

→

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MICROMAIL

From Page 163

sound like vibes or a xylophone, a guitar or just about anything else the ear can be deceived into hearing.

With Commodore's SID chip a highly realistic harpsichord sound is possible although programming SID is a lot more difficult.

Deceit is the name of the game and is practised by careful selection of the ADSR parameters. The piano envelope you gave in November's Micromail could arguably be used for a guitar – or a harpsichord.

What I'm saying is, I doubt if there is another sufficiently different envelope which will produce a better harpsichord sound. In practice it may sound better without the vibrato and possibly with a faster decay.

A tune played with a piano/harpsichord type envelope can be all manner of things. You can make slight adjustments to the envelope according to taste.

But all is not lost. The ADSR plays a big part in convincing the ear what sort of instrument it's listening to. Having settled upon our envelope, if we play harpsichord-type tunes this will reinforce the ear's conviction.

Likewise, to imitate a tuba, play very low notes rather slowly with a slowish attack and medium decay. And so on for other instruments.

Although the Beeb's sound chip, or rather the software which drives it, is quite sophisticated there are quite a few things it can't do.

I hope this helps J. Allison and other readers. Perhaps also they may be persuaded to part with £5.95 for a copy of Making Music on the BBC Computer which, among other things, explains the above in greater detail. At the very least may I suggest a furtive perusal in W.H. Smiths. – **Ian Waugh, author of Making Music on the BBC Computer (Sunshine), Sunderland, Tyne and Wear.**

Juki 6100 problems

I HAVE a Juki 6100 printer with sheet feeder attachment and have encountered certain problems concerning its control.

The various functions of the printer are controlled by variations of VDU1,27 and although I can get the simpler functions to work the vertical tabbing defeats me.

The form I wish to use to output my data onto is 12 inches square and I want to:

☐ *Print a line of text one-eighth of an inch from the top edge of the paper, then print the first line of data one-eighth of an inch below that.*

The next thing is to reset the line spacing index so that subsequent lines of data – another 18 – are printed half an inch apart. Does this mean I have to set top and bottom margins, length of page, form feed and so on at this stage?

☐ *Perform a form feed so that the next form arrives in the right place to repeat the above process.*

☐ *Achieve some way of counting the number of lines that are output to the printer so that form feeds occur in the right place.*

The third item is also part of the second problem. When using a sheet feeder some method of counting lines is required so that when the end of page is reached subtotals can be carried forward onto the next page, which of course has been fed to the correct position. – **Bob Mita, Allesley Park, Coventry.**

● I'm afraid we are going to have to rely on our readers again for this one. Can anyone help?

Switch over to machine code

I AM an avid reader of your most informative magazine and found the article in the October issue concerning the split screen most interesting.

The listing has already proved useful, but I did find the fact that the program was a Basic procedure at times a little limiting, messy to load, plus the fact it does use some 'user RAM'.

*May I suggest this machine code listing as an extra aid, based on Martin Millen's excellent idea. The source code once assembled may be *SAVEd (LOC%+100) and thus *LOADed at any time without disturbing any Basic program.*

It works by intercepting the buffer vector and testing for a function key being pressed. The keys are best not programmed, all 10 keys produce the screens as in the original program, and there is a check so that the function will only work when Mode 0 is selected.

CALL LOC% initialises the routine by setting the vectors, and thus should only be called once, unless Break is pressed.

I decided on LOC% = &900, but this code could be assembled in any suitable place.

I hope this will be of some use to my fellow readers. – **N.D. Blount, Fallings Park, Wolverhampton.**

```
   10 LOC%=&900
   20 FOR R%=0 TO 3 STEP 3
   30 P%=LOC%
   40 [OPT R%
   50 LDA &22A:STA &80
   60 LDA &22B:STA &81
   70 LDA #init MOD 256:STA
 &22A
   80 LDA #init DIV 256:STA
 &22B
   90 RTS
  100 .init
  110 CMP #128
  120 BCS check
  130 .jmp JMP (&80)
  140 .check
  150 CMP #138
  160 BCS jmp
  170 .window
  180 STA &70
  190 PHP:PHA:TXA:PHA:TYA:P
 HA
  191 LDA &355
  192 CMP #0
  193 BNE return
  200 LDA &70
  210 SEC:SBC #128
  220 ASL A:ASL A
  230 TAX
  240 LDA #28:JSR &FFEE
  250 LDY #0
  260 .loop INY
  270 LDA store,X
  280 STA &70,Y
  290 JSR &FFEE
  300 INX
  310 CPY #4
  320 BNE loop
  330 LDA #17:JSR &FFEE
  340 LDA #129:JSR &FFEE
  350 LDA #12:JSR &FFEE
  360 LDA #28:JSR &FFEE
  370 LDA &71:CLC:ADC #1:JS
 R &FFEE
  380 LDA &72:SEC:SBC #1:JS
 R &FFEE
  390 LDA &73:SEC:SBC #1:JS
 R &FFEE
  400 LDA &74:CLC:ADC #1:JS
 R &FFEE
  410 LDA #17:JSR &FFEE
  420 LDA #128:JSR &FFEE
  430 LDA #12:JSR &FFEE
  440 .return PLA:TAY:PLA:T
 AX:PLA:PLP
  450 JMP (&80)
  460 .store
  470 ]
  480 NEXT
  490 !store=&004F1F00
  500 !(store+4)=&00281F00
  510 !(store+8)=&004F1F28
  520 !(store+12)=&0C281F00
  530 !(store+16)=&0C4F1F28
  540 !(store+20)=&18281F00
  550 !(store+24)=&184F1F28
  560 !(store+28)=&004F0C00
  570 !(store+32)=&0C4F1F00
  580 !(store+36)=&134F1F00
  600 REM****CALL &900*****
```

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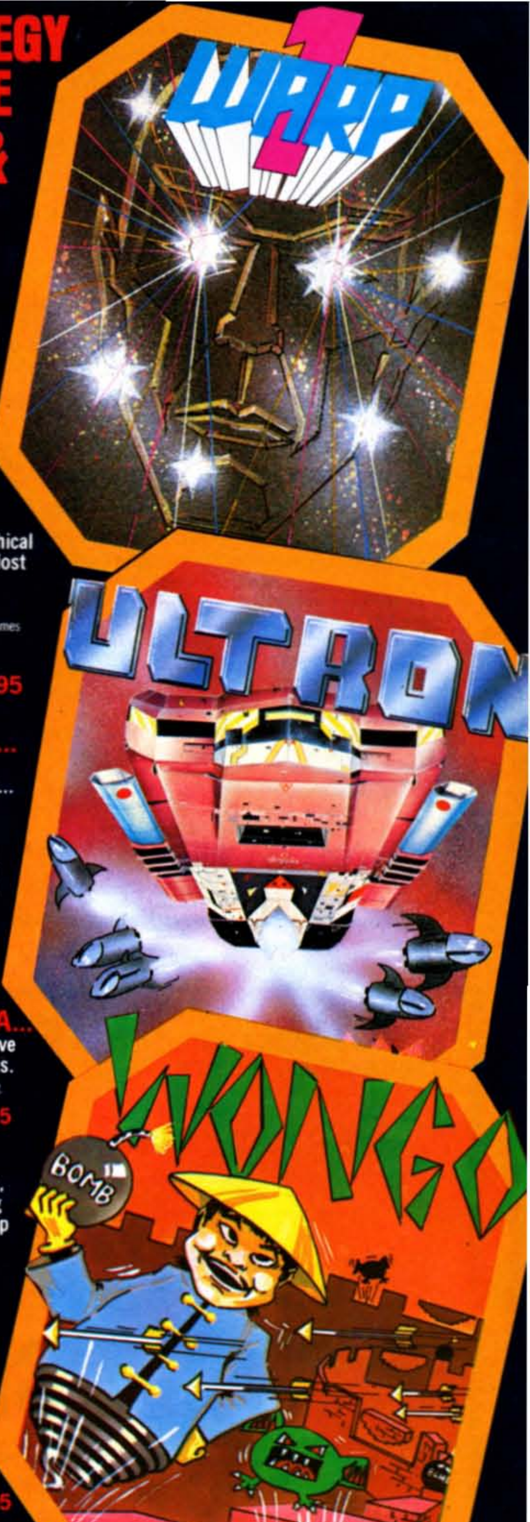

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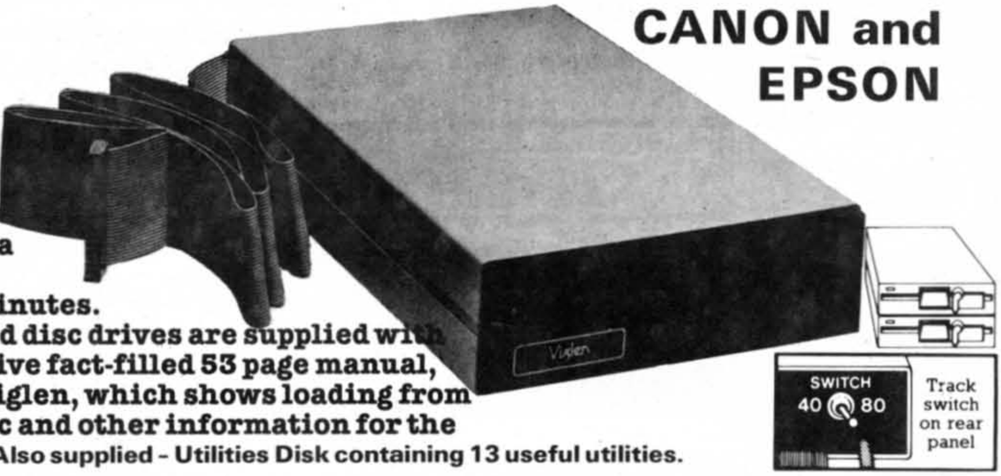

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This remarkable Grafpad from British Micro allows you to input information into your computer – very accurate and high resolution, not to be confused with other models which are both more expensive and less accurate. Supplied with all necessary cables, manual and sample programs, to allow you to develop your own application programmes.

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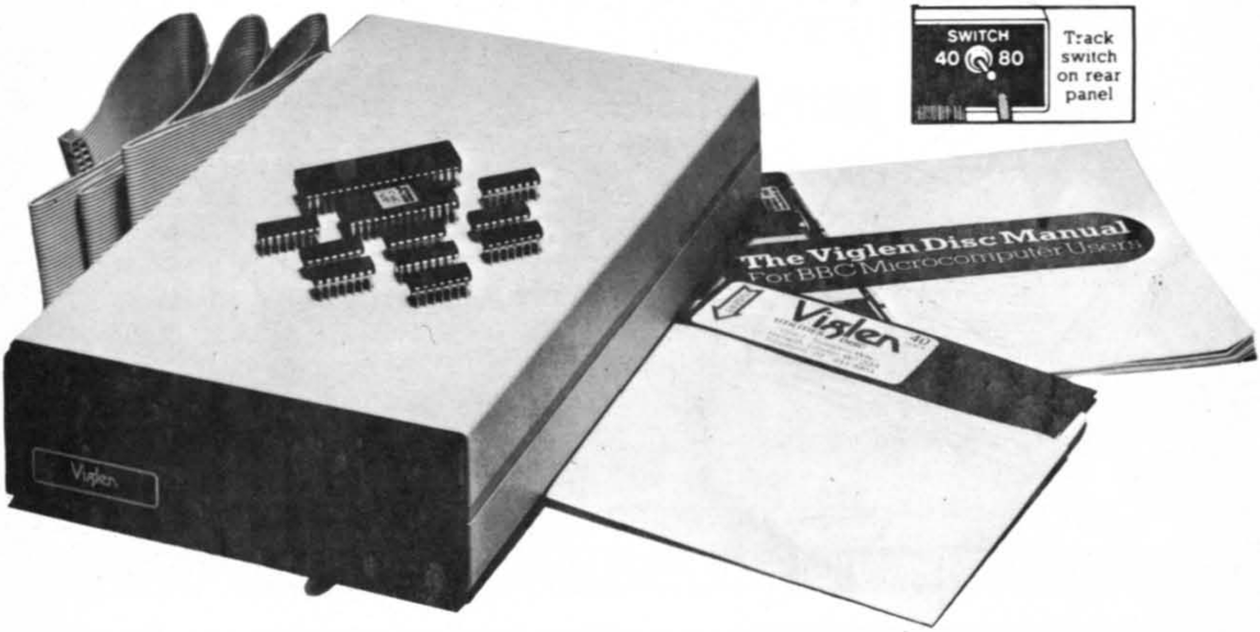
MU 2/3

TEAC 400K DISK DRIVE & ACORN DFS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The Viglen Disc Manual
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COMPLETE DISK SYSTEM FOR THE BBC MODEL B

- Package assumes you own a BBC Model B with switched mode power supply plus 1.2 operating system.

OFFER INCLUDES:

- Disk Interface (call at factory for free fitting while you wait) or supplied with easy to fit instructions.
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- Comprehensive fact filled, 53 page manual including techniques of loading from cassette to disk. Not available elsewhere.
- Utilities Disk including formatting, verifying, BASIC program comparator, disassembler, Epson screen dump, dual catalogue (giving 62 files), large printing and others.

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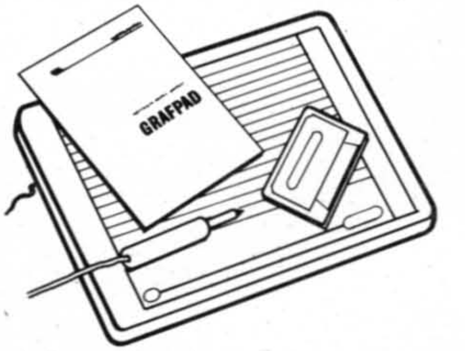

This remarkable Grafpad from British Micro allows you to input information into your computer – very accurate and high resolution, not to be confused with other models which are both more expensive and less accurate. Supplied with all necessary cables, manual and sample programs, to allow you to develop your own application programmes.

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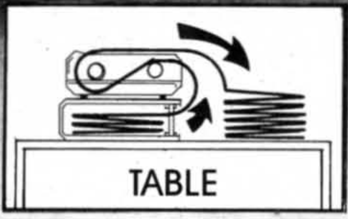

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PHILIPS COMPUTER MONITORS

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DON'T BUY

just a colour monitor when you can have this New Philips TV + Monitor for only

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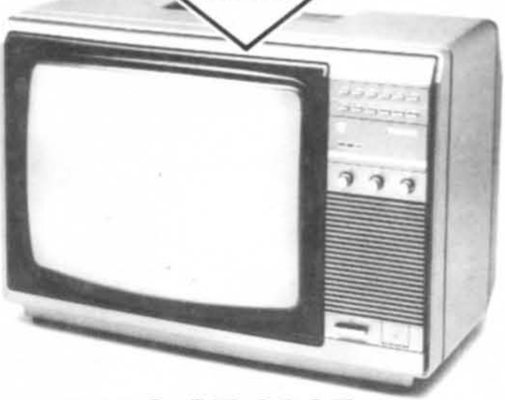
INC. VAT

ONLY £89 INC. VAT

PHILIPS BM 7502 GREEN SCREEN MONO

From the highly successful 'Philips 80 Range', here is a monitor specially designed to display graphics and alphanumeric data with perfect clarity.

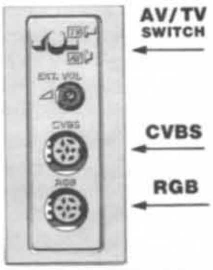
- 12" high resolution, 20MHz band width, anti glare screen
- RGB, Composite Video (CVBS) and Audio Input
- 2000 character (80 x 25) display
- Swivel base available £13.95 incl. VAT
- Suitable for the following computers: BBC B (free leads supplied for the Beeb) Apple II, IIE, II plus Apple III; Atari 600XL, 800, 800XL, 1450XL; Coleco Adam; Commodore Vic20, Vic64; IBM-PC with interface; Texas Instruments TI99/4A; Timex Sinclair; Einstein; QL



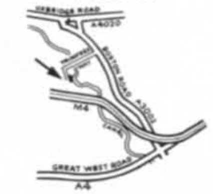
PHILIPS CT 2007 COLOUR TELEVISION + MONITOR

This very popular unit is not only an excellent Colour Television Receiver, but also a sophisticated computer monitor. Featuring:

- Free lead supplied for BBC Micro
- Headphone socket and speaker mute switch
- RGB, (TTL and can be modified for linear), Composite Video Input (CVBS), Audio Input plus this model has an AV/TV switch
- 14" picture tube with 0.65mm or slotted pitch
- Maximum 80 characters per line 20 MHz band width
- 12 pre-select buttons
- Aerial supplied
- Swivel base extra £13.95 inc VAT



Open 9 – 5 weekdays,
9 – 4 Saturdays



Full Twelve Months Guarantee

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BY POST: To purchase either of the items in this advertisement simply fill in the coupon with your requirements. Enclose your Cheque/P.O. or use your Access/Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the addess on the coupon. Allow seven days for delivery and add £8.00 for Postage, Packing and Insurance for each item. Prices subject to change without notice.

BY TELEPHONE: Ring (01) 843 9903. Credit Card holders Access/Barclaycard can purchase by telephone. Please give Card No., Name, Address and the items required.

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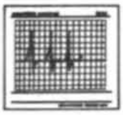
HEART MONITOR BBC B

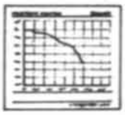
Can be used as a Lie Detector, or for monitoring fitness, practising relaxation etc.

The hardware – a built and tested unit which simply plugs into the analogue port – uses an infra-red sensor to detect blood flow in your finger.

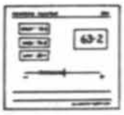
SIX screens are generated by the software which include:



A standard ECG screen which gives continuous heartbeat trace with digital pulse readout, optional ECG beep etc.



A Rate of Recovery screen which can help in assessing how fit you are by showing how fast your heartrate recovers after exercise. Full details on how to use this and all the other screens are included.



A Bio-Feedback screen which you can use to help you learn to relax, or watch other people's heart reaction to word suggestions or awkward questions etc – can be hysterically funny and often revealing.

The monitor is simple to use: the function keys provide various facilities to alter grid sizes etc., and fast: all time-critical operations are performed by machine code routines.

The monitor unit comes complete with software on cassette or disc (please state 40/80 track), and manual.

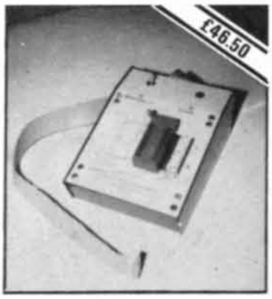
Only £37.95 inclusive (please add £2 for disc version)

Please make cheques payable to:

COMPUTER PEOPLE
30 Westholme Gardens,
Ruislip, Middlesex.

Used in schools and colleges nationwide

EPROM PROGRAMMER
FOR THE BBC



A very high quality product direct from the manufacturers, contained in attractive sloping box with low insertion force socket and neon indicator for programming fitted as standard, the software adopts the high efficiency method for programming 2764 and 27128. This allows up to 100% faster programming, software in machine code, supplied on cassette and can be placed in eprom. Very easy to use, menu driven with easy to use instructions. This unit is completely self contained with its own power supply and plugs into the user port.

THIS PROFESSIONAL UNIT ALLOWS:

1. Will program: 2716, 2732, 2532, 2764 and 27128 eproms.
2. Copy eprom into memory and compute checksum.
3. Blank check eprom.
4. Program eprom from memory.
5. Verify byte by byte and compute checksum.
6. allow buffer start area to be changed.
7. All operating system calls may be used when in menu mode.
8. Semi-intelligent programming. Typical time to program a 2764 8k device is approx. 50 sec. depending on the data to be programmed.
9. Additional software supplied to enable your own program (basic or machine code) to be put into eprom with the necessary leader information to allow calling with a *command. Downshift routine to enable basic programs to be run is also supplied.

COST £46.50 please add 15% VAT £1.00 post and package

Also available: RAM/ROM card 16 socket – details on request.

ORDERS TO:

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Parker Road, Chelmsford, Essex CM2 0ES.
Access Orders Phone:
Chelmsford (0245) 350188 24 hours

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The Datapad 16b.

A fully travel key, 16 way keypad that plugs into the user port.

Complete with cassette software to make it fully programmable.

Datapad 16b £34.95.
Including VAT and P&P.

Made in England

The Delta 3b Twin.

An alternative to the ACORN joystick. Two analogue self centering joysticks wired to one plug, which plugs directly into the analogue or an Electron Plus 1 interface.

Delta 3b Twin £19.95 per pair.
Including VAT and P&P.

Obtainable from your Voltmace stockist or direct from:-

Voltmace

Voltmace Limited
Park Drive
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SG7 6EV
Telephone (0462) 894410

Callers welcome at the factory – Monday to Friday.

Expandable console for the BBC Micro
As supplied to Universities, Colleges, Schools, Business and Home Users.

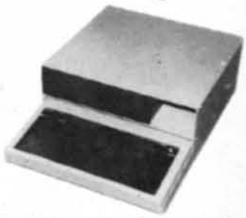
Not just a monitor/tv stand but an expansion console which gives your micro the professional look. Protects and encloses your micro with room for disc drives and 2nd. processor or teletext adapter etc., all untidy connecting wires safely out of sight within the console. Made of light yet strong aluminium with a textured finish in matching BBC colour. Available now a bolt on extra module to the console for further expansion options. YES this console will grow with your needs.

Basic BBC console as shown **£44.99** + £4 carriage.

Bolt on expansion module
£14.99 + £2 p&p

Free security bracket to educational users on request.

SPECIAL TORCH MODEL AVAILABLE: £46.99
+ £4 carriage



Matching Printer Stand, can double for VDU Stand over the micro – only £14.99 + £2 carriage

ELECTRON CONSOLE

The console will house the ELECTRON and will safely support the expansion interfaces which will plug into the rear of the micro and will support the VDU at eye level. Tidies up all wiring between the micro, cassette and VDU. The console stores the cassette and tapes and will allow space for drives at a later date.

Electron console as shown
£34.99 + £3 p&p

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Please add 15% VAT.
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Silent COMPUTERS

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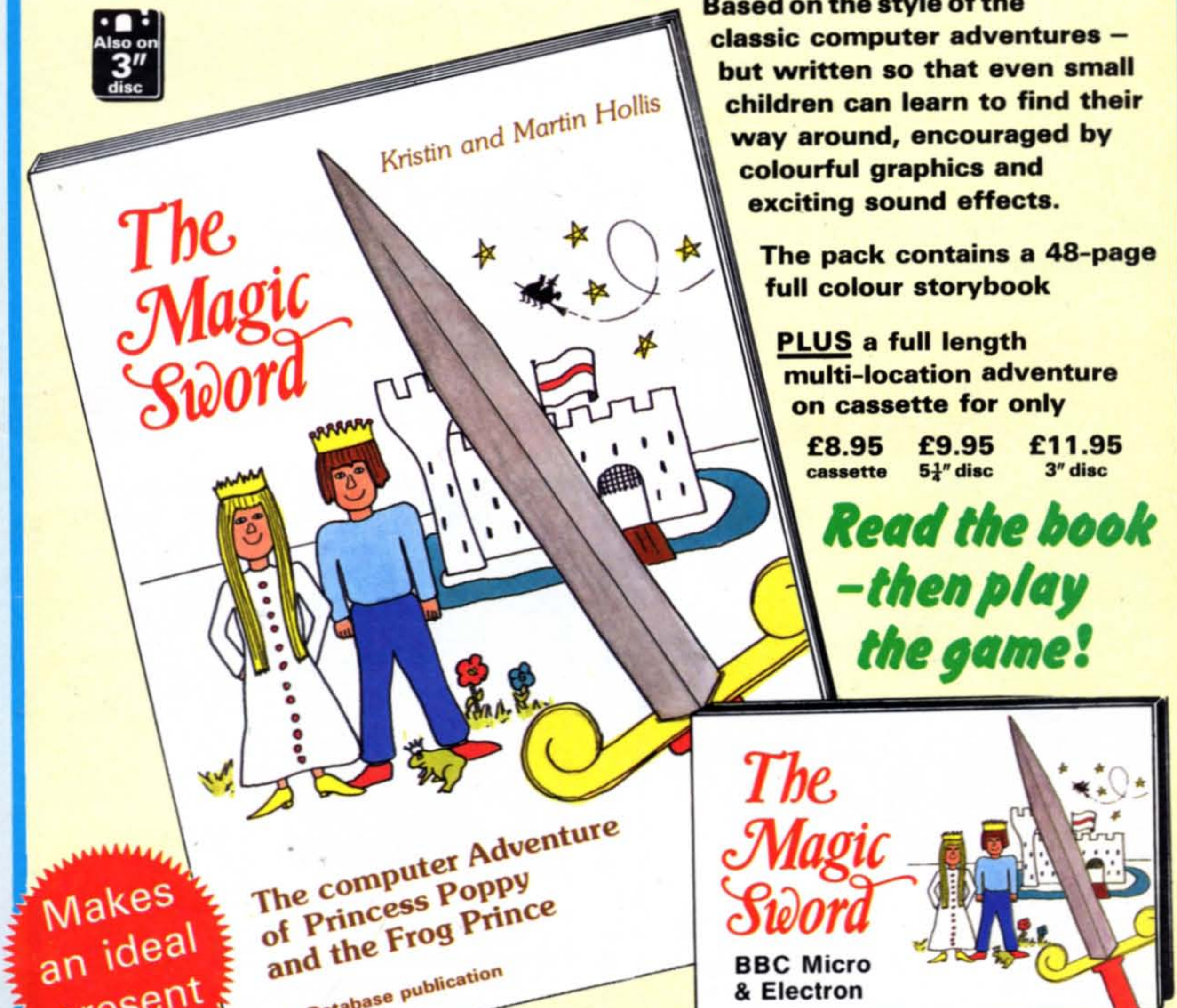
TEL: 01-801 3014 (24 Hr Ansaphone)

THE MICRO USER

MAIL ORDER OFFERS

A Magical Adventure for the very young!


Also on 3" disc
Kristin and Martin Hollis
The Magic Sword
The computer Adventure of Princess Poppy and the Frog Prince
A Database publication
Makes an ideal present
The Magic Sword
BBC Micro & Electron

Based on the style of the classic computer adventures – but written so that even small children can learn to find their way around, encouraged by colourful graphics and exciting sound effects.

The pack contains a 48-page full colour storybook

PLUS a full length multi-location adventure on cassette for only

£8.95	**£9.95**	**£11.95**
cassette	5¼" disc	3" disc

Read the book – then play the game!

Also available from selected branches of Boots.

Use the special order form on Page 7 – No stamp needed!

Give your micro the power of SPEECH!

You've heard of computer feedback, now try computer talkback with our low cost offer on the official Acorn speech extension.

- ★ 164 words and word parts from which you can construct your own new sounds with ease.
- ★ Simple to use from Basic – each word is called via its own unique reference number used with the SOUND –1 command.
- ★ Quick and easy to install. For full speech capability simply insert two chips. (Also included is a socket for plug in cartridges. This will require a little skill at soldering, but is not necessary for the basic speech function.)
- ★ Suitable for all BBC Micros with Version 4 boards or later. (Pack includes technical details on how to modify earlier versions.)
- ★ Easy-to-understand instruction manuals included.
- ★ A decent British accent – Kenneth Kendal at his best.

SAVE £25 off the recommended retail price of £55

At only £29.95 it's an offer you really shouldn't miss. Make sure of yours today.

Your BBC Micro needs protecting!

Our luxury dust cover is made of soft pliable water-resistant transparent vinyl, bound with strong cotton and decorated with the *Micro User* logo in black.

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NOW EVEN BIGGER

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THE MICRO USER
Education Special
Classroom Computing on the BBC Micro
15 full length programs to stimulate, educate and entertain ...in school and at home
Also on 3" disc

The Micro User Education Special – No. 1

Packed with practical programs which teachers can use in the classroom and parents can use to teach children at home. Mathematics, language, shape recognition, coordinates, drawing and geometry are just some of the subjects covered by programs that will fascinate children of all ages, from early learners to secondary pupils.

PLUS the most detailed guide available to all the educational software that has been provided for the BBC Micro.
All programs are alphabetically listed and described.

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14 ORIGINAL GAMES
Golden Games for the BBC Micro
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An Aladdin's cave of really outstanding programs that will delight every BBC Micro enthusiast. It contains 14 great games – all original and all fully listed. Arcade games, card games, strategy games and sports simulations – they're all there.

PLUS a unique A to Z guide to all the games software currently available for the BBC Micro. Something you will want to keep and refer to again and again in the months to come.

Cassette and discs of the 14 full length programs also available (7 on Disc A and 7 on Disc B)

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THE BEEB BODY BUILDING PACKS

Upgrade your BBC Micro with these Beeb Body Building Packs.

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- **Pack 3:** *Give your Micro data-processing muscle by building a dual cassette system.*
- **Packs 4 and 5:** *Control mains equipment in complete electrical isolation. Pack 4 is rated at 2 amps, pack 5 at 10 amps.*
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- **Pack 10:** *A high speed A/D with many applications. For instance, turn your microcomputer into an oscilloscope!*
- * **Pack 11:** *A pulse rate monitor. Ideal for keep-fit fanatics and experimenters alike.*
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- * **Pack 19:** *Interface for Atari Trak-Ball when used as a CAD tool.*
- **Pack 20:** *Interface for Atari Trak-Ball when used as a games add-on.*

**** All these packs are also available fully assembled. For a small extra charge constructors who run into difficulty assembling pack 8 can send it in for testing. It will be returned fully***

ATARI Trak-Ball

TRAK-BALL
ATARI

AT LAST! HANDS ON COMPUTER GRAPHICS
The ideal CAD tool for the BBC Micro

Roll into action with the new ATARI TRAK-BALL for your BBC Micro. Turn tighter corners, zero in on video villains faster and blast 'em more accurately! Works with any joystick game. Capture the ultimate in arcade action and excitement at home. *(See the Body Building feature on Page 119).*

Trak-Ball	**£19.99**
With kit pack 19 (CAD)	**£37.94**
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With kit pack 20 (Games)	**£39.95**
With assembled pack 20 (Games)	**£45.95**

THE ADVANCED USER GUIDE
FOR THE BBC MICRO
BRAY, DICKENS & HOLMES

The Advanced User Guide *is the essential companion for the BBC Micro . . . with 512 information-packed pages*

Featured in its 512 pages are:
- ★ the BASIC Assembler
- ★ 6502 machine code reference section
- ★ complete descriptions of all FX calls
- ★ BBC memory usage and vectors explained
- ★ full interfacing details for the user port, tube, analogue port, 1 MHz bus
- ★ paged ROMs explained ★ and lots, lots more.

With many examples to illustrate the text, this guide is the indispensable reference work for the serious BBC Micro programmer.

£11.50

ASSEMBLY PROGRAMMING MADE EASY
FOR THE BBC MICRO

Assembly Programming Made Easy *puts the magic world of machine code at your finger-tips*

Here is a really easy guide for the enthusiastic beginner to assembly language for the BBC Micro. Using easy examples, cartoons and short, very simple programs you will quickly learn how to put graphics on the screen, use the BBC operating system and bring the machine to life.

£4.95

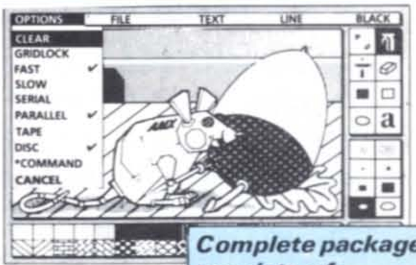
To make learning assembly language even easier send for the combined book and tape cassette containing all the programs.

£6.95

Save £10

on the incredible

AMX MOUSE



No wonder the computer press has greeted the arrival of the AMX Mouse with rave reviews. For the first time it gives the BBC Micro advanced facilities until now only available on more expensive machines such as the Apple Macintosh. For beginners it's an ideal introduction to such sophisticated techniques as icons, windows, pull-down menus, spray cans and other devices for creating your own on-screen pictures. And with this special offer from *The Micro User* comes a package of software that opens up a wide range of other uses. ***This is a limited offer – so don't delay in placing your order.***

Complete package consists of:

AMX Mouse
AMX Rom
AMX Art
Icon Designer

Purchasers will receive software on cassette and either 3in or 5¼in 40 track disc. Please state preference on order form.

FOR ONLY

£79.95

QUICK TO LEAR

THAT'S...

MINI OFFICE

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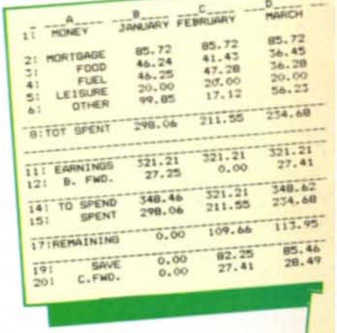

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 -   ___A_____  ___B_____ ___C_____  ___D_____ __
 1!  MONEY     JANUARY FEBRUARY     MARCH

 2!  MORTGAGE     85.72     85.72     85.72
 3!      FOOD     46.24     41.43     36.45
 4!      FUEL     46.25     47.28     36.28
 5!   LEISURE     20.00     20.00     20.00
 6!     OTHER     99.85     17.12     56.23
 -------------------------------------------
 8:TOT SPENT     298.06    211.55    234.68
 -------------------------------------------
 -------------------------------------------
11! EARNINGS     321.21    321.21    321.21
12!   B. FWD.     27.25      0.00     27.41
 -------------------------------------------
14! TO SPEND     348.46    321.21    348.62
15!    SPENT     298.06    211.55    234.68
 -------------------------------------------
17!REMAINING       0.00    109.66    113.95
 -------------------------------------------
19!     SAVE       0.00     82.25     85.46
20!   C.FWD.       0.00     27.41     28.49
```

JUST LOOK WHAT THIS PACKAGE CAN DO!

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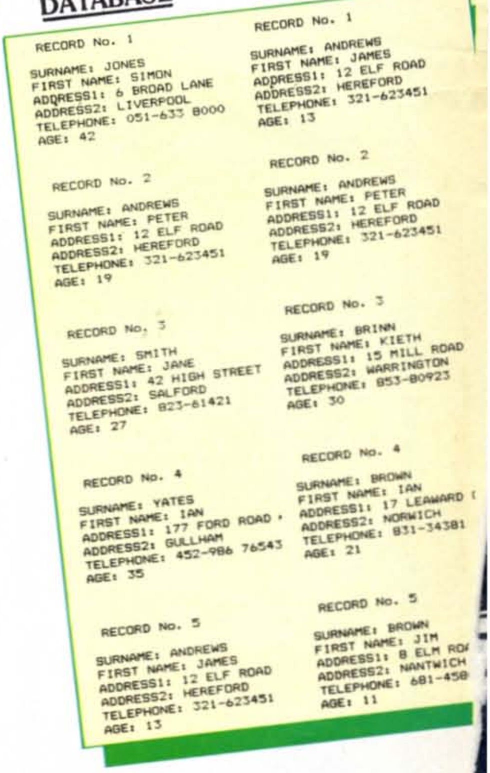

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RECORD No. 1
                                     SURNAME: ANDREWS
SURNAME: JONES                       FIRST NAME: JAMES
FIRST NAME: SIMON                    ADDRESS1: 12 ELF ROAD
ADDRESS1: 6 BROAD LANE               ADDRESS2: HEREFORD
ADDRESS2: LIVERPOOL                  TELEPHONE: 321-623451
TELEPHONE: 051-633 8000              AGE: 13
AGE: 42
                                     RECORD No. 2
RECORD No. 2
                                     SURNAME: ANDREWS
SURNAME: ANDREWS                     FIRST NAME: PETER
FIRST NAME: PETER                    ADDRESS1: 12 ELF ROAD
ADDRESS1: 12 ELF ROAD                ADDRESS2: HEREFORD
ADDRESS2: HEREFORD                   TELEPHONE: 321-623451
TELEPHONE: 321-623451                AGE: 19
AGE: 19
                                     RECORD No. 3
RECORD No. 3
                                     SURNAME: BRINN
SURNAME: SMITH                       FIRST NAME: KIETH
FIRST NAME: JANE                     ADDRESS1: 15 MILL ROAD
ADDRESS1: 42 HIGH STREET             ADDRESS2: WARRINGTON
ADDRESS2: SALFORD                    TELEPHONE: 853-80923
TELEPHONE: 823-61421                 AGE: 30
AGE: 27
                                     RECORD No. 4
RECORD No. 4
                                     SURNAME: BROWN
SURNAME: YATES                       FIRST NAME: IAN
FIRST NAME: IAN                      ADDRESS1: 17 LEAWARD
ADDRESS1: 177 FORD ROAD ·            ADDRESS2: NORWICH
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TELEPHONE: 452-986 76543             AGE: 21
AGE: 35
                                     RECORD No. 5
RECORD No. 5
                                     SURNAME: BROWN
SURNAME: ANDREWS                     FIRST NAME: JIM
FIRST NAME: JAMES                    ADDRESS1: 8 ELM RO
ADDRESS1: 12 ELF ROAD                ADDRESS2: NANTWICH
ADDRESS2: HEREFORD                   TELEPHONE: 681-458
TELEPHONE: 321-623451                AGE: 11
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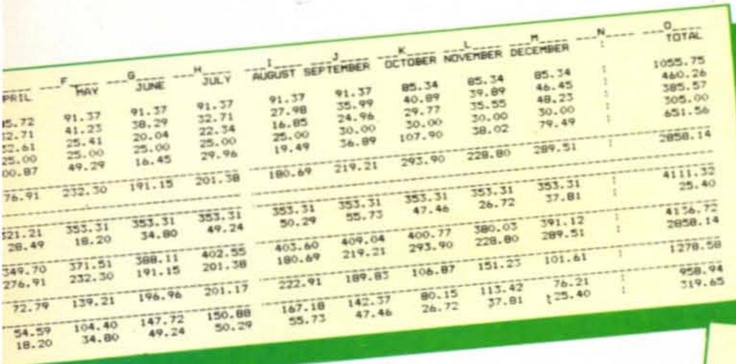

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         MAY     JUNE     JULY   AUGUST  SEPTEMBER OCTOBER NOVEMBER DECEMBER    :      TOTAL
 5.72   91.37    91.37    91.37    91.37    91.37    85.34    85.34    85.34     :    1055.75
 2.71   41.23    38.29    32.71    27.98    35.99    40.89    39.89    46.45     :     460.26
 2.61   25.41    20.04    22.34    16.85    24.96    29.77    35.55    48.23     :     385.57
25.00   25.00    25.00    25.00    25.00    30.00    30.00    30.00    30.00     :     305.00
00.87   49.29    16.45    29.96    19.49    36.89   107.90    38.02    79.49     :     651.56
-----------------------------------------------------------------------------------------------
76.91  232.30   191.15   201.38   180.69   219.21   293.90   228.80   289.51     :    2858.14
-----------------------------------------------------------------------------------------------
521.21 353.31   353.31   353.31   353.31   353.31   353.31   353.31   353.31     :    4111.32
 28.49  18.20    34.80    49.24    50.29    55.73    47.46    26.72    37.81     :      25.40
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349.70 371.51   388.11   402.55   403.60   409.04   400.77   380.03   391.12     :    4136.72
276.91 232.30   191.15   201.38   180.69   219.21   293.90   228.80   289.51     :    2858.14
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 72.79 139.21   196.96   201.17   222.91   189.83   106.87   151.23   101.61     :    1278.58
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 54.59 104.40   147.72   150.88   167.18   142.37    80.15   113.42    76.21     :     958.94
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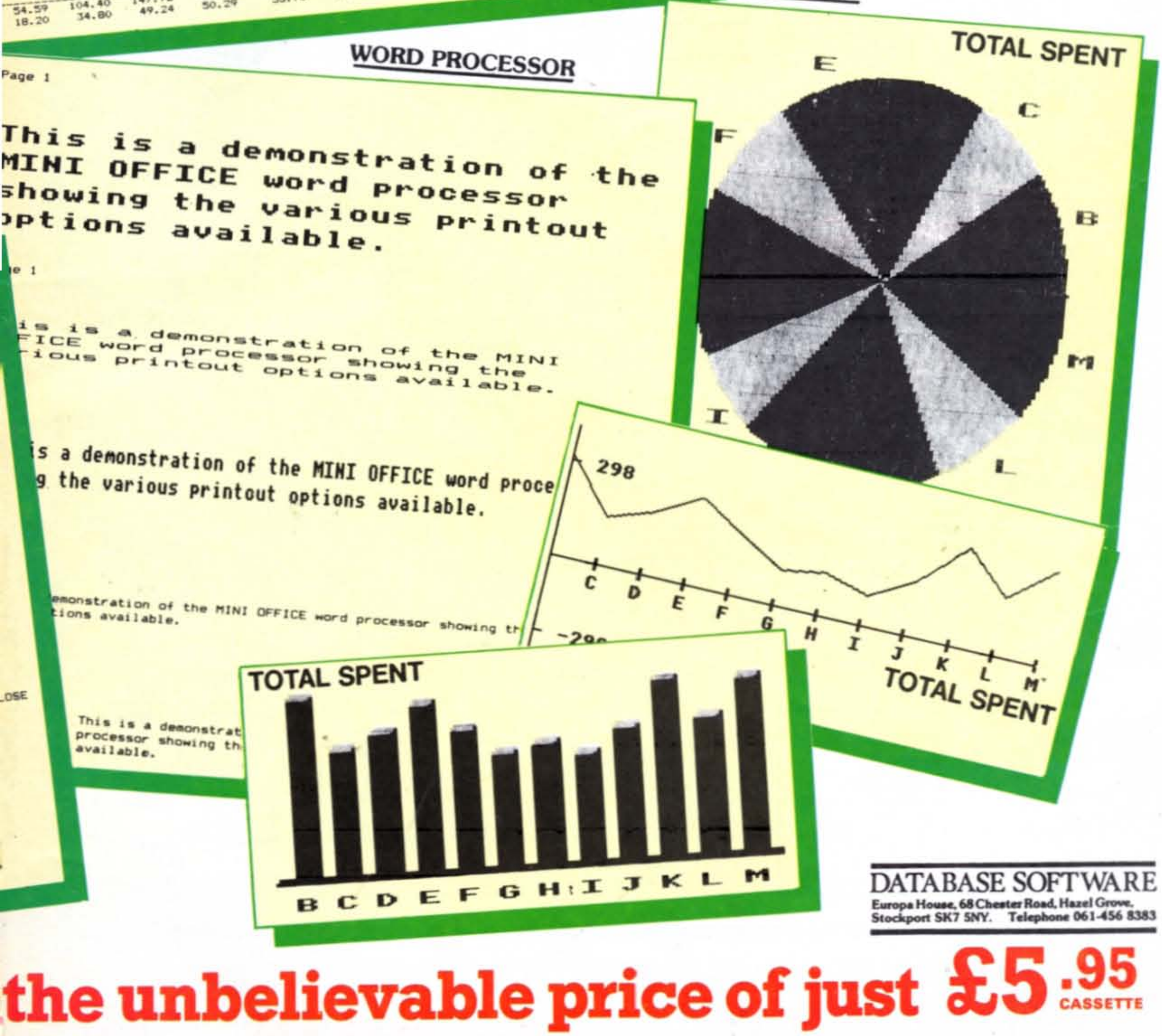

WORD PROCESSOR

Page 1

This is a demonstration of the
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showing the various printout
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MARCH 1983: Deathwatch, a superb arcade game **Bingo,** clever uses of the randomise function; **Bubblesort** routines; **Tests** function keys in machine code. 0.1 **Colour** and **Graphics Routines:** create a kaleidoscope of screen designs.

APRIL: King Kong, rescue girls from the Empire State Building before killing Kong. **Nim,** a structural game of strategy. **Tokens,** unravel the Basic ROM: **Formatter,** an essential disc utility; **Disassem,** a full machine code disassembler.

MAY: Air Strike, a fast and furious arcade game: Test your mental powers with **Pelmanism: Anagrams,** the word game. **Character,** generate vertical and inverted text. **Teletext,** animation in Mode 7. **Beeb,** two joystick exercises.

JUNE: Space Pilot, lost in space you must fight off repeated attacks from alien life forms. **Nomism,** you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **Colourful Characters Plus** other listings from the June issue.

JULY: Tenpin, a simulation of Tenpin Bowling: **Spacepods,** beat the alien hordes: **Cup,** exciting 3D graphics techniques **Test** and **Steady,** programs to accompany the Beeb Body Building Course. **Breakfix,** don't let Break destroy your precious variables!

AUGUST: Fruities, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **Animation,** a suite of programs that really bring your screen alive; **Casdisc,** the machine code downloader for your disc system; **Mode 7** colour routines.

SEPTEMBER: Robin & Marian, rescue Maid Marian from the Sheriff of Nottingham. **Galactic Invaders,** an exciting arcade game. **DFS Benchmarks,** 14 DFS test programs. **Animation,** new techniques. **Terminal,** connect a BBC Micro to a mainframe.

OCTOBER: Fishing, a compulsive day's angling. **Joykey,** convert programs to joystick. **Pentest** and **Bellringer,** for Micro User lightpens. **Contours,** an educational program. **Link** BBC Micros to each other. **Plus** all the listings from the first Electron User.

NOVEMBER: Goblins, an enchanted journey. **Blackjack,** the casino favourite. **Charge** and **Pendulum,** Body Building Course part 9. **Sideways,** programs in ROMs. **Pendraw,** a light pen sketching program. **Plus** all the programs from the second Electron User.

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DECEMBER: Tower, rescue London's treasure. **Santa,** help Father Christmas. **VDU 23,** an invaluable character defining utility. **Paged,** graphic techniques **Plus** all the listings from the third issue of Electron User.

JANUARY 1984: Barrels, an all-action arcade game. **Noteplay,** an entertaining musical utility. **Dump1** and **Dump2,** multitone screen dumps. All the programs from our **Sound, Beginners'** and **Graphics** articles **Plus** 12 programs from the fourth Electron User.

FEBRUARY: Invasion, the classic arcade game. **Frogs,** fun for all the family. **Engvgen,** a logic game. **Balance,** a number learning program. **Key,** single key entry for the BBC Micro **Plus** nine other programs from *The Micro User.*

MARCH: Mazemunch, block-busting arcade action. **Birthday,** family fun for our anniversary. **Derrick,** number fun for infants. **Pixelpen,** high resolution for lightpens.

APRIL: Microgolf, the simulation. **Eastermaze** and **April Fool,** seasonal games. **Seawall** and **Magic Square,** maths fun. **Filer** and **Album,** a database of sounds. **TRX1, TRX2,** RS423 driver. **Heartrate,** monitor your fitness.

MAY: Dug Dig, asteroid adventures. **Damraider,** naval action. **Envaid,** easy envelopes. **Steppers,** Body Building motor control. **Spiro,** graphics windows. **Adventure,** a trapdoor maze. **Renumber,** program utility. **Bigletter,** large type. **Memory,** RAM efficiency.

JUNE: Roadracer, 3D driving action. **Quadline,** four-in-a-line logic game. **Monitor,** machine code debugging routines. **Toolkit** 8271 disc controller explored. **Areas,** easy maths. **Spell,** spelling education.

JULY: Doomrun, deep space drama. **Backgammon,** the classic board game. **Keys,** user defined key editor. **Save?** and **Tidisk,** disc utilities. **Alice1** and **Alice2,** mini-adventures. **Terminal1** and **Terminal2,** two communication programs. **Acoustic,** software for the Body Build Modem.

AUGUST: Castle, an enthralling adventure program. **Gridman,** a high speed game of strategy. **Tedit,** a superb Teletext editor. **Dsquare,** simple number fun. **Dedit,** a versatile disc editor. **Input,** the ultimate general input routine. **Bells,** Alice's mini-adventure.

SEPTEMBER: Villains, save your crystals from the evil onslaught. **Rollerball,** an intriguing game of strategy and agility. **Microterm,** comms terminal. **T/Textdump,** Mode 7 screen dump. **Numbersign,** simple number skills test for infants.

OCTOBER: Wampus, explore the labyrinth and slay the beast. **Balloon,** brave the caves, escape the Goulogs. **Splits,** split screen utility. **Pageram,** paged RAM programs. **Input1/2,** alternative inputs for the disabled. **Morecol,** extended colours. **D/A,** a waveform generator. **Integer,** direct addressing speed.

NOVEMBER: Buster, line up the diamond blocks. **Duel,** two player action. **Seaside,** picture fun for the young. **M7letters,** teletext large letters. **Dscload,** loading large disc files to &E00. **6502,** second processor programs. **Synth,** musical Body Building programs.

DECEMBER: Painter, can you paint the precipitous pyramid? **Miner,** delve into the deadly mine's depths. **Snowvad** and **Carol,** two seasonal programs. **Garden,** shape-matching for infants. **Medit,** a memory editor. **Catalog** and **Save,** useful disc utilities. **Ladders,** Alice's mini-adventure. ***Plus Omega Probe – a full length machine code arcade game.***

JANUARY: Rover, guide our retriever to his rations. **Backgammon,** an exciting two player version. **Matchwood,** shape recognition for infants. **Messages,** machine code printing. **Speedtext,** display text at different rates. **Search,** a powerful programming tool. **Second processor,** Body Building and graphics routines. ***Plus Galactic Tycoon, our superb free game.***

FEBRUARY: Helicopter Dogfight, two player action. **Craal,** dungeon adventure. **Pilot,** the CAL language. **Riddle,** your first Pilot program. **Disdump,** the ultimate disassembler. **Talker,** a powerful speech chip utility. **Change,** program tidier. **In/out** – output from assembler. All the programs from Alice, Body Building and machine games. ***Plus Atomic Protector – a full length machine code arcade game.***

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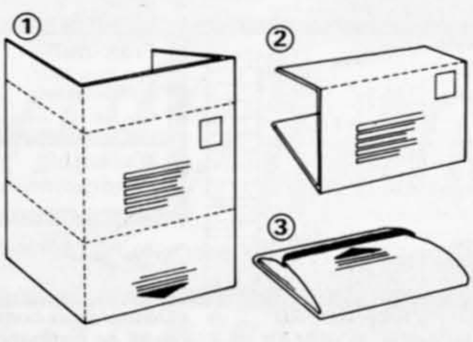

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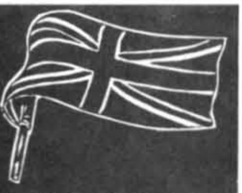

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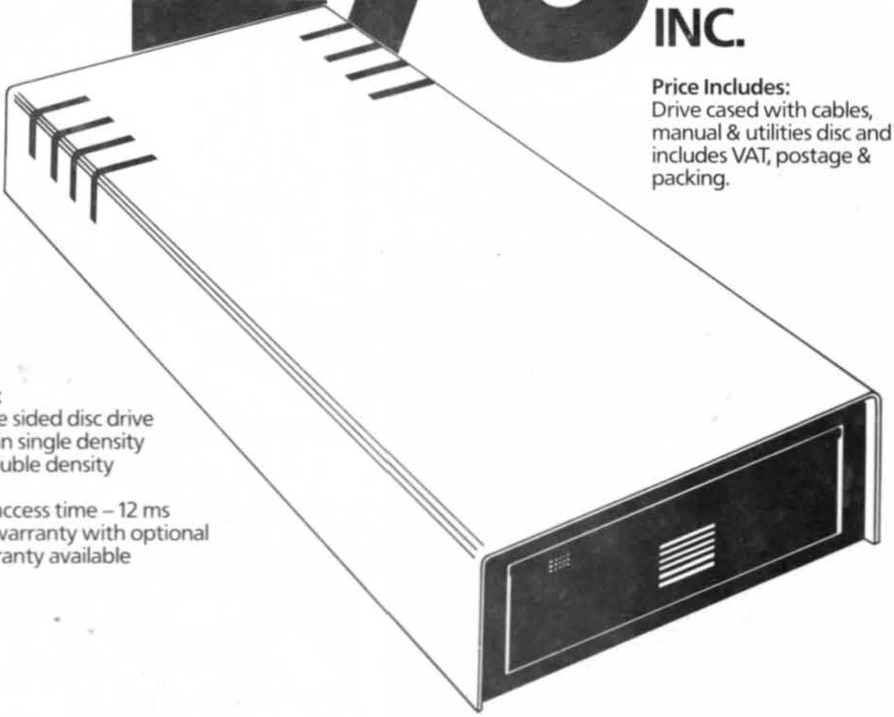
LIMITED SPECIAL OFFER

CANON 6108 2/3 HEIGHT (57.5mm) 40 TRACK D/SIDED 200K FLOPPY DISK DRIVE

£75 INC.



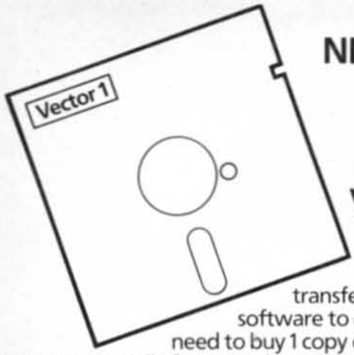
Price Includes:
Drive cased with cables, manual & utilities disc and includes VAT, postage & packing.

Specifications:
40 track double sided disc drive
capacity 200k in single density
Operates in double density
Belt driven
Track to track access time – 12 ms
Full 12 month warranty with optional extended warranty available

► All canon 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination. To give a clear operating status, as follows.

40 TRACK MODE: ________ LED GREEN
80 TRACK MODE: ________ LED RED
POWER ON: ________ HALF-ILLUMINATION *(GREEN OR RED)*
DRIVE SELECTED: ________ FULL-ILLUMINATION *(GREEN OR RED)*

► The Sanyo disc drive is a "half-height" 40/80 track switchable unit of standard dimensions, built to Sanyo's usual high standards of quality and reliability.
]



NEW SOFTWARE RELEASE FROM CHASE DATA

Vector 1 –

The ultimate tape to disk utility

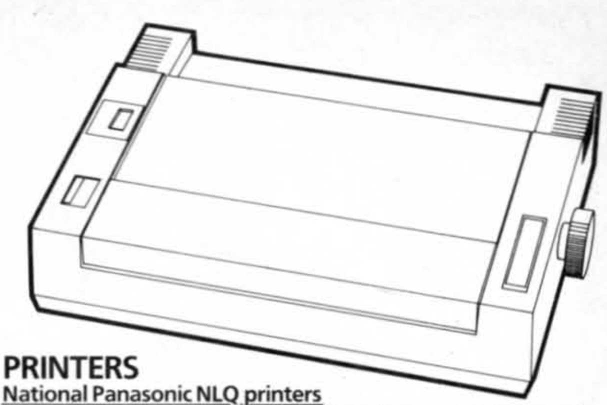
Vector 1 allows you to transfer almost all your tape software to disk. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disk utility available.

Vector 2 –

Disk to disk utility

Vector 2 allows you to make backup copies of all your valuable disk software. It is the most advanced utility of its kind available. It is a condition of sale that neither of these products are used for infringement of copyright.
Not compatible with double density interface.

Vector 1	**£16**	On its own
	£15	If purchased with disk drive
Vector 2	**£16**	On its own
	£15	If purchased with disk drive



PRINTERS

National Panasonic NLQ printers

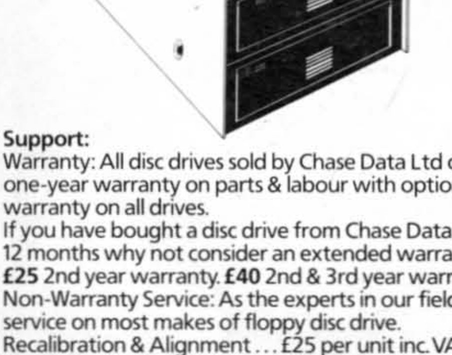
This is our latest acquisition. Direct from Japan, this high speed multi mode NLQ printer offers the following features.
120 CPS print speed. Prop 75 (AVE) CPS NLQ 22 CPS
9 x 9 standard 12 x 18 NLQ
Proportional and NLQ modes
High resolution (quad density) bit image modes
Multiple character modes
Compact cartridge ribbon
Precision print head for sharp quality printing
Easily switchable to NLQ
FX-80 compatible control codes

£289 inclusive of UK carriage & VAT.
Cable to BBC £10 inc.

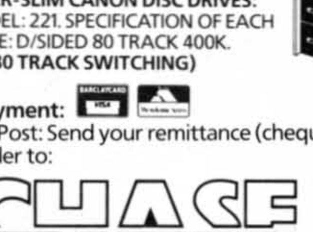
All inclusive price list: This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.

	CANON					SANYO
Model	**110**	**6108**	**210**	**220**	**221**	**596D**
Formatted Capacity per drive on BBC Micro:	100K	200K	200K	400K	400K	**400K**
Single Drive & Case:	£85	£75	£99	£149	£199	**£149**
Single Drive & Case PSU:	£110	–	£124	£174	£229	**–**
Dual Drive & Case:	£174	–	£199	£279	£379	**£289**
Dual Drive & Case/PSU:	£204	–	£234	£309	£409	**£309**

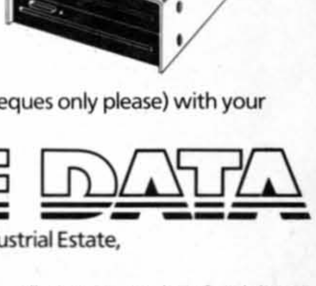
DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.



SLIM CANON DISC DRIVES:
MODEL: 110. SPECIFICATION OF EACH DRIVE: S/SIDED 40 TRACK 100K. MODEL: 210. SPECIFICATION OF EACH DRIVE: D/SIDED 40 TRACK 200K. MODEL: 220. D/SIDED 80 TRACK 400K. **(40/80 TRACK SWITCHING)**



SLIM SANYO DISC DRIVES:
MODEL: 596D. SPECIFICATION OF EACH DRIVE: D/SIDED 40/80 TRACK 400K.
(40/80 TRACK SWITCHING)



SUPER-SLIM CANON DISC DRIVES:
MODEL: 221. SPECIFICATION OF EACH DRIVE: D/SIDED 80 TRACK 400K.
(40/80 TRACK SWITCHING)

Support:

Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.
If you have bought a disc drive from Chase Data during the last 12 months why not consider an extended warranty contract.
£25 2nd year warranty. **£40** 2nd & 3rd year warranty.
Non-Warranty Service: As the experts in our field, we can offer service on most makes of floppy disc drive.
Recalibration & Alignment ... £25 per unit inc. VAT (parts extra).
Phone for details: (Tel: 0784-38487).

Payment:

By Post: Send your remittance (cheques only please) with your order to:

CHASE DATA

Unit 2, Crabtree Road, Thorpe Industrial Estate,
Egham, Surrey, TW20 8RN.

By Phone: ☎ (Tel: 0784 38487). Allow up to 21 days for delivery.

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The debugging monitor utility for machine code programs on the BBC B

Includes:

- ★ Single stepping through RAM and ROM – including operating system
- ★ Intelligent memory mover
- ★ Breakpoints in ROM
- ★ Microsecond timer
- ★ Machine code program relocator
- ★ Single step through graphics routines
- ★ Intelligent masked string search routine

Plus – "Front panel" display, OSCLI commands available within debugger, conditional breakpoints at relative branch instructions, display of four memory windows updated during single stepping, user zero page preserved during single stepping, arithmetic operators + − × ÷, output to printer, ASCII dump, hex dump, disassembly, block fill, plus much more.

With complete instruction booklet

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Designed by Kevin Toms

FOR THE BBC MODEL B

Some outstanding features of the game
● **Matches in 3D graphics** ● Transfer market
● **Promotions and relegation** ● F.A. Cup matches
● **Injury problems** ● Full league tables ● **Four Divisions**
● Pick your own team for each match ● **As many seasons as you like**
● Managerial rating ● **7 skill levels** ● Save game facility
● **Financial manipulations** ● 64 teams and customising feature
● You can even be sacked!

Prices:		
	BBC Model B	£7.95
	Commodore 64	£7.95
	Spectrum 48K	£6.95
	ZX81 16K	£5.95

(N.B. 3D GRAPHICS ARE NOT INCLUDED IN THE ZX81 VERSION)
Overseas orders add £1.50

Strategy Game of the Year, 1983
(Nominated)
Golden Joystick Awards

"This is a game for fanatical followers of soccer who have a driving ambition to manage their own team.

There is every opportunity for you to show your skill, by buying the right players to strengthen your team, selecting the right blend of skills to counter your opponents and balancing the club budget at the end of each week.

The aim is to lead your team to promotion, and there is plenty of scope as you start at the bottom of the fourth division!

The game is well thought out and gives you a number of reasonable options at each round from buying and selling players to selecting a different team. This is no false implementation either; each season involves 22 games in the league and a full set of cup fixtures too.

What I found most remarkable was the graphical representation of the match highlights. This is a large program but there are crude yet engaging, moving graphics showing each attack on goal during the match. The save game facility is essential; one game took five hours just to reach Division Two. A real winner." D.C.

instructions	85%
playability	95%
graphics	85%
value for money	95%

★ ★ ★ ★ ★

HOME COMPUTING WEEKLY 23rd October 1984.

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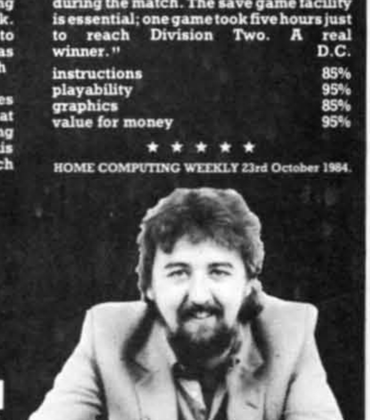

Access a world of Information
WITH YOUR BBC MICRO

Today, there are literally hundreds of databases worldwide which can be accessed by your BBC micro. These include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American data bases such as 'The Source' and 'DIALOG'. The equipment can also be used to send telex messages. The Pace range of inexpensive communications products are designed to provide accurate data exchange whilst being extremely flexible and easy to use.

NIGHTINGALE - The Modem

NIGHTINGALE
MULTI FUNCTION MODEM
PACE
APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use
S/2592/3/E/500065

Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale has a built-in expansion capability, allowing the addition of auto-answer and auto-dial with battery back-up. The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

Nightingale being 'hard wired' is not subject to the noise interference errors common to outdated acoustically coupled devices. In addition Nightingale features a simple self-test facility for easy installation.

Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

In order to use a versatile modem like Nightingale to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC.

Commstar is currently the only package for the BBC micro which offers easy access to Prestel (and other viewdata services), together with user to user communication and exceptional file transfer capabilities.

Supplied on Eprom, Commstar is instantly accessible, simple to use and extremely flexible. Just look at the possibilities:- access Prestel, Micronet, Viewfax, Homelink and Telecom Gold, rummage through bulletin boards and chat to literally thousands of other computer users, but there's more. Commstar's versatility enables the BBC to be used as an inexpensive work station for a main frame or mini-computer.

COMMSTAR - The Software

PACE
COMMSTAR
PACE
COMMS

The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just £139 plus V.A.T.

Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.

SPECIAL INTRODUCTORY OFFER

For a limited period, when you order the Nightingale modem you will receive discount vouchers entitling you to the following:-

KNOWLEDGE-INDEX

20% discount off standard enrolment fee (normally £25)

This remarkable collection of databases includes over 22,000,000 items covering Agriculture, Books, Business, Electronics and Computing, Corporate and Company News, Education, Engineering, Government Publications, Legal Information, Magazine Articles, Mathematics, Medicine and News/Current Affairs (The enrolment fee also includes 2 hours of free access time).

onetoone

50% discount off standard enrolment fee (normally £50)

One to one is an electronic message service designed to give you the communications capabilities of a telex at much lower cost. By using your micro fitted with a Nightingale modem you can produce telexes, letters, reports and contracts, and send them in seconds to any destination. Courier delivery, priority mail and radio paging are also included in this highly efficient communications service.

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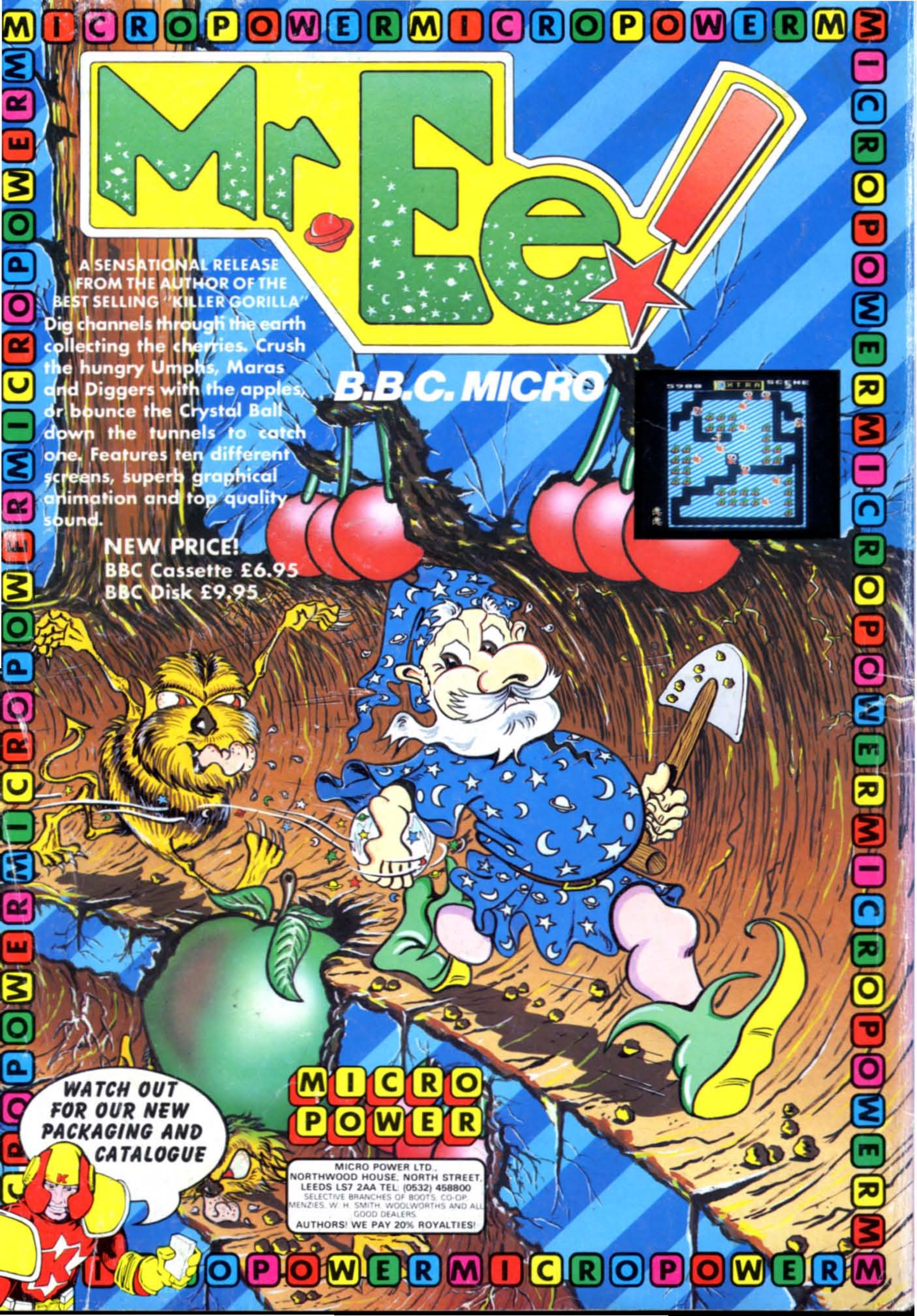
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